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CHILD DEVELOPMENT

This number reports studies of defective speech and constitutional types; of racial differences in physical measurements; of behavior traits and attitudes in children and adolescents.

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CHILD DEVELOPMENT

EDITOR-IN-CHIEF

BUFORD JOHNSON

Director of the Child Institute of the Psychological Laboratory, and Professor of Psychology of The Johns Hopkins University.

ASSOCIATE EDITORS

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E. V. McCOLLUM
Professor of Biochemistry, School of Hygiene and Public Health, The Johns Hopkins University.

EDWARDS A. PARK
Professor of Pediatrics, The Johns Hopkins University Medical School.

MANDEL SHERMAN
University of Chicago, Chicago, Illinois

T. WINGATE TODD
Professor of Anatomy, Western Reserve University Medical School.

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The Treatment of Defective Speech Due to Cleft Palate and Associated Conditions[1]

DON C. LYONS

SPEECH, is sound produced by the passage of expired or exhaled air through an elastic tube composed of the tissue which makes up the pharynx, the oral, and the nasal cavities. If all tissue relationships in and about this tube are normal, fully developed, and completely coördinated with the muscular and with nerve activity, the passage of air in this tube produces full rounded voice sounds which we call correct speech. On the other hand, anything which alters the amount of air which passes, or which changes the shape of the air column, produces what we term, defective speech.

Usually there are six possible factors which may produce defective voice sounds or speech. These according to various authors are as follows:

1. Inability to appreciate the meaning of word sounds.
2. Disturbances in hearing.
3. Defective mental development.
4. Conditions which prevent the normal control of the muscles of articulation.
5. The child's inability to coördinate nerve centers which have been maladjusted, not a mental deficiency.
6. Mechanical defects in the voice passage.

While the author is interested primarily in the last of the causes of defective speech just mentioned, he feels that the final result of the treatment of any mechanical defect lies in the correct appreciation of all other associated factors. Therefore the treatment of defective speech as caused by failure of the palate to close must embrace more than just the operative procedure.

One can group the types of congenital failure according to the amount of tissue involved. Brophy classified this anomaly of development into fifteen groups starting with the simple bifid uvala, then the cleft of the uvala extending forward to the fibers of the levator palati, then the entire soft palate, the cleft involving the hard palate to the alveolar ridge, then the one which involves one side of the premaxillary process, both sides. Further a group involving just the premaxillary process extending through a series of failure of development to total aplasia.

In the past the oral surgeon or general surgeon who operated for the

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relief of the cleft of the palate, felt that the operation had been a success if the cleft was closed. The operation might take several repetitions, but closure was the eventual goal. Unfortunately, too often the result was closure at the expense of the velum and a much scarred, greatly shortened, rigid tissue was left which was practically useless from a speech standpoint. Even though the operation was termed an operative success, it was far from a functional one. Today, the first aim of the surgeon is function, for without a tissue capable of responding to all the demands of phonetics, there is little value in closing the cleft.

The soft palate is composed of five pairs of muscles, the pharyngo palatini, the muscularis uvali, the levator veli palatini, the tensor palatini, and the glosso palatini. These muscles acting against each other raise and depress the velum, relax and tighten it. The muscularis uvali in the child usually becomes a single muscle, but at birth and in the cleft palate is a double muscle. Fortunately if this is bifid there is little disturbance to many voice sounds and there are probably many individuals who have this first degree cleft palate who are completely unaware of it.

There are at present two different groups of operators, each feeling that his method of closure of the cleft is best. The first group is that which follow the principles laid down by Brophy some years ago. He felt that the reduction of the width of the cleft straight in from the tuberosities of the maxilla was of great importance, and to do this used the direct application of force and lead plates with silver wires to hold the segments in place until union took place. The second group feel that only an indirect force is necessary. The cleft is adapted at the alveolar ridge, the lip repaired, and then the action of the muscles restored to function by this repair is depended upon to complete the reduction. In the first method the early use of wires and plates called for relaxation of the muscles by cutting. Even then the tention often caused the wires to cut through and produced considerable scar tissue. Naturally such a method did close the hard palate but frequently produced a useless velum. The second method produces a good velum, but does not take into consideration the reduction of the width of the cleft at the posterior border of the hard palate. While it is felt by this group that this width gradually reduces as the child grows, the chances of operative failure are much greater because of the greater distance that tissue must be bridged.

A third group offer still another solution, that being the use of the Thiersch graft or of a Pedicle graft of tissue. Such operative procedures are of great value when previous operative procedures have caused sloughing or destruction of tissue, or in adult cases which would be otherwise inoperable, but one must remember that there is no muscular tissue in such grafts, and from a phonetic standpoint, they are absolutely useless. Further the numerous stage operations needed cause considerable scar tissue. It is possible in some cases to make a sort of a velum in this procedure by transforming the tensor palatini into a levator

by breaking off the hamular process of the external pterygoid plate as Dorrance and others have suggested.

If the operation for the relief of the cleft palate is to be a success from the standpoint of restoring function to the velum and normal surfaces for the articulation of sounds, it is very important that the child be operated on as early as possible, or advisable. The word, 'advisable' is used because most of such babies are malnourished due to inability to eat properly, and often suffer from respiratory infections, because of the oral-nasal condition. Such things must be corrected as far as possible before operation. Early operation is advised because the bony structure can be molded and the maxillary bone approximated more easily. There is less deformity at this time which also permits the tissue to return to normal relationships quicker. An early operation permits the muscles of the soft palate to be brought into operation before they have atrophied from disuse. The earlier the operation the better is the chance for normal speech development. It is especially necessary to relieve the conditions before speech habits develop. From a purely surgical viewpoint the early operation is advised because there is less possibility for surgical shock and early operation avoids the possibility of malnourishment during childhood and the danger of pneumonia which these babies face.

The treatment of the defective speech after operation is necessary. Simple closure of the cleft, even perfect restoration of the velum is not sufficient; speech training is usually necessary. If the child is operated upon quickly after birth, very little training other than that which the usual mother gives her child is necessary. However, it is unfortunate, but many of these children never are operated upon until after the speech habits are formed. This is especially true if there is not an associated cleft lip.

The unrelieved cleft palate places a mental handicap on the child. Such a child quickly gets out of contact with the rest of the world. He is seldom seen playing with other children of his age. He is unable to meet the usual social contacts of daily life without feeling a deep sense of inferiority or of abnormality. He draws himself into his shell and stays there, developing the mental attitude and mental activity of congenital deficiency. This is the problem which confronts the teacher. Even after the cleft palate has been corrected, it takes many months or years to break this mental attitude. Fortunately in most instances one finds the IQ near the normal range and word perception is normal. The actual problem consists in teaching the child to project the stream of air through the mouth rather than the nose, and to change tongue and muscle habits. Woldstad (5) gives a splendid suggestion as to how to overcome the associated mental handicap. She suggests that the child be taught to excel in some field of endeavor so that he will not have a sense of inferiority, his superiority counterbalancing the handicap.

There is still much which must be done by the oral surgeon in devising an operation which will successfully restore all the phonetic power of the palate as well as close the cleft.

Treatment of the defect depends more than any one thing upon early recognition, early operative intervention, and early speech training.

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Variation in Susceptibility to the Conditioning of Inhibition as an Index of Constitutional Type

EDWINA A. COWAN AND MARJORIE FOULKE

THE work herein reported was conducted at the Wichita Child Research Laboratory between September, 1930, and March, 1934. It was an attempt to add one more to the battery of tests, still unfortunately limited, at the service of the examiner who undertakes to obtain accurate, quantitative information concerning the mental make-up of children needing clinical examination. To earn a place in the battery used by a conscientious examiner under such circumstances, a test must meet certain specifications; it must be reliably standardized; it must yield information the nature of which is helpful in a reasonable number of cases in determining what shall be done about the case after the evidence is all in; the giving of the test must involve apparatus, testing technique and an amount of time all within the reach of the average examiner called upon to furnish information needed by those responsible for the training of children. It is in the belief that the test arrived at through the work herein reported meets these specifications that we offer it for consideration.

Thanks are due to Miss Esther Spann, Miss Marguerite Nicholson, and Miss Elizabeth Mills, students of Friends University, who gave unstintedly of their time; to L. W. Mayberry, Superintendent of Wichita Public Schools; to Miss Maud Huntz and Miss Gertrude Dowd, principals of grade schools; and to the many school teachers whose cordial coöperation made it possible for us to use the test on the school children in their charge; to Mrs. George Temple, who assisted in tabulation; and to Dean O. B. Baldwin, whose suggestions and criticisms were invaluable throughout the course of the work.

PROBLEM

Whatever may be one's theoretical bias toward the general problem of constitutional type and, more particularly, toward types as differentiated by Pavlov (46) into over-excitatory, over-inhibitory and plastic, and whatever may be one's degree of willingness to accept his physiological explanation for these constitutional types, the fact remains that one cannot have a share in the training of large numbers of children without recognizing that it is almost impossible to teach some of them not to do things, that it is equally impossible to make others do anything at certain times, and that there is a third group who are always open to reasonable persuasion but are capable of controlling their own impulses if appropriately motivated. When one is dealing with a child it is

of great advantage to be able to know in advance his proper placement among these groups. The training methods adapted to one group will fail completely with children of another. So clear-cut is the difference in their requirements that in making placement for adoption, an entirely different type of foster parent is sought for children of the two extreme groups. If this difference is a genuine constitutional difference (and in the light of our results we believe it to be) then it should not be necessary to depend upon fairly long time observation by a skilled observer for knowledge as to the group in which a given child should be included. In the case of such an important constitutional difference a usable and reasonably reliable test which will make possible a quantitative judgment of this difference becomes valuable to the examiner. Our present problem was: first, the devising of a test which should differentiate between children on the basis of ease with which inhibition could be conditioned; and second, to determine if possible by means of this test whether the assumption is sound that this difference in ease is constitutional.

Historical background of the problem

The problem of constitutional type is a lineal descendent of the ancient problem of temperament. Whatever the classifications arrived at, we find in the earliest classical discussions of temperament three primary concepts from which any valid discussion of the subject must take its departure: temperament must differ in individuals in such a way as to permit classification; it must be inborn; and it must be some quality common to the whole personality. That the modern discussions of constitutional type have not been deflected from these three basic concepts by changing the name of the problem is shown by a recent definition of the word "constitution": "Constitution is the total of bodily and psychical (both normal and morbid) qualities transmitted by heredity, i.e., in purely endogenous ways" (36).

Opposed, however, to the summary dismissal, found in the classical discussions, of the problem of temperament with a more or less arbitrary classification and a generalized description of type, we find the modern workers in this field developing new classifications of type, attempting to correlate type differences with differences in physiological mechanisms, and developing type descriptions on the basis of individual differentiations arrived at under experimental conditions.

Best known of the older classifications of temperament is the grouping which divides people into cholerics, melancholics, sanguines and phlegmatics. This grouping has been followed in a general way by Pavlov, but elaborated into over-excitatory, over-inhibitory, lively and stolid plastic types, which Pavlov (46) correlates with physiological conditions within the central nervous system. A new departure in classification was made by Jung (24, 25, 26) when he divided people into extroverts and introverts. This innovation was followed by other new classifications which used several different kinds of variations among individuals as the basis for their groupings.

One basis for constitutional differentiation is that which divides people

into pre-psychotic and non-prepsychotic groups, and again divides the pre-psychotic types into those which are predisposed to one or another kind of abnormality. This basis for classification of types is exemplified by the following systems. According to Hunt (22, 23) people may be divided into erethitic and kolytic types. Orbison (43) mentions constitutional psychopathic inferior personalities and classifies them with regard to the following traits (with behavior as his chief criterion): (1) hereditary taint; (2) hyper- or hypo-irritability of emotional sphere; (3) imbalance of judgment control over behavior and other voluntary acts; (4) imbalance of reason; (5) lack of true appreciation of moral or ethical values. Among constitutional psychopathic inferiors he includes the following subdivisions: (1) inferior or inadequate personality; (2) paranoid; (3) emotional instability; (4) criminalism (admits too vague); (5) pathologic lying and stealing; (6) sexual psychopathy; (7) nomadism (too vague).

The schizoid vs. cycloid classification of Kretschmer has been accepted as the basis for variations of his classification, the variations largely consisting of the identification of types lying between the extremes and of subdivisions of each of the extremes.

We also have the definition by Ravà (54) of temperaments into two types, instinctive and emotive. Disturbances of the instinctive type result in exaggerated activity, as in manic-depressives, while disturbances of the latter mean exalted emotivity, as in neurasthenics and psychasthenics.

On the basis of his own experimental technique in uniting motor activity with verbal reactions, Luria (31) classifies people into two types: the reactively stable and the reactively labile. The reactively stable are those in whom difficult situations do not cause break-down of the "functional barrier" between uncoördinated and coördinated activities, and therefore cause no delay of the coördinated activity. The reactively labile are those in whom the difficult situation causes the "functional barrier" to break down, and coördinated motor activity is superseded by uncoördinated motor activity.

Perhaps we should include in this connection the studies of pre-psychotic personality by Bigelow, Blalock, Courbon, Steinitz, Guiraud, Enke, and del Greco (4), (5), (8), (58), (19), (13) and (9) in an effort to arrive at a descriptive analysis which would make the pre-psychotic recognizable before objective criteria of mental disease are available. Insofar as this descriptive analysis includes constitutional traits, the pre-psychotic individual forms a group among constitutional types.

In addition to the foregoing which stress the psychotic and pre-psychotic types, we have the classification of types dealing more particularly with differentiations among average people. Individual differences in the mechanisms of learning have appeared to some authors as constitutional differences, and we have the following distinctions drawn: children were classified by Osipova (45 and 44) into associative-stimulative and associative-inhibitive types, according to the speed with which they formed associa-

tion reflexes; the first type forms associative reflexes quickly, the second slowly.

Henning (20) in asking his subjects to draw or write something which they would consider entirely different from the figures, drawing, words or sentences shown to them, believed that he could distinguish two types: the first type is always influenced by examples of some sort (samples, current opinion, phrases, dogma, etc.); the second type arrives at solutions which in no way remind one of the examples.

The presence or absence of eidetic imagery (30, 23 and 65) constitutes another basis for type determination, and those possessing eidetic imagery are further differentiated. The B (Basedow)-type refers to an eidetic imagery which is produced, dismissed and changed at will; similar in color to the stimulus object; detailed; and fluctuating in general character. The T (Tetany)-type is more independent of control; often of complementary color to the stimulus object; in general character fixed and unfluctuating. One or other of these types of eidetic imagery may occur predominantly in the experience of any one individual or the same person may experience both types. Jaensch's attempts to correlate these differences with physiological and personality differences have led him to postulate the predominance of B-type or T-type as the manifestation of a constitutional factor.

Washburn, Keeler, New and Parshall (62) regard the following opposite extremes as temperamental traits: emotional-calm; irritable-non-irritable; timid-fearless; and extrovert-introvert.

Furukawa (14) differentiates between individuals of active temperament and those of passive temperament.

Pende (49) describes two fundamental temperament types: individuals who possess an exaggerated functional tonus of the sympathetic system and the auxiliary glands, as opposed to those displaying a hyperfunctioning of the parasympathetic system.

In addition to the foregoing classifications of constitutional types, we have those based more directly on structural and physiological individual differences, constitutional in their nature. Perhaps the best known is Kretschmer's (28) classification of pyknic, athletic, and asthenic.

Galant (15) presents a system of constitutional types for women which classifies them into: (1) the stenosomic constitutional group, including the asthenic type, or the very small woman, and the stenoplastic type, or the robust asthenic; (2) the mesosomic constitutional group, which includes the pyknic type, or the ideal of womankind, and the mesoplastic type, or the work-type of woman; (3) the megalosomic group, made up of the athletic type, or the masculine type of woman, and the subathletic type, or the slenderly built, athletic type, and the euryplastic type, or the very large woman.

MacAuliffe (32) distinguishes a round type of slackened vitality and a flat type of accelerated vitality. Similarly, Pende, (48 and 47) classifies into the following types: anabolic type (short round, vagotonic, with predominance of thymus, adrenal and genital glands; emotionally stable); catabolic type

(long, flat, sympathotonic, with predominance of thyroid, parathyroids and hypophysis; emotionally unstable); eurythmic type (harmoniously balanced).

Bouyer (6) offers a group of pyknoids which lies between the pyknic and athletic types in its characteristics.

The attempts to correlate differences in constitutional type with characteristic differences in physiological and psycho-physical mechanisms have been varied in their mode of attack. The relationship of temperament to the results of different types of intelligence tests and ratings has been studied by Oates (39, 40, 41), Porteus and Babcock (53), and Peters (51). Ödegaard (42) observes differences in psychogalvanic reactivity among psychiatric patients whom he groups into six diagnostic groups as follows: normals, organic and toxic psychoses, hysteria, depressions and neuroses, manic excitement, schizophrenia. Washburn, Keeler, New, and Parshall (62) found differences between some of their opposite extremes of temperamental traits which corresponded to differences in speed of reaction to noise, variability of such reaction time, and number of errors made in mirror-tracing of an outline star. Tedesco (1) found that the values of the cardio-vascular pressure were higher in individuals of the asthenic type than in the pyknic type between the ages of twelve to sixteen years. For individuals between seventeen and nineteen years this condition is reversed, and the values of the cardio-vascular pressure are higher for those of the pyknic type.

Differences in the reinstatement of experience through memory were found by Washburn and her associates (60, 61, 63, 59, 64) to be characteristic of temperamental differences between the emotional and the calm groups. Both directed and free recollection of emotional experience were richer among the emotional group. The emotional subjects have slightly more intense and numerous recollections of emotion, especially the disagreeable emotions, and greater galvanometric deflections. Those of cheerful temperament find more pleasant associations to words than those of depressed temperament.

Baxter (2) investigated the rate and strength factors as related to temperament, with negative results.

Moore (37) found greater speed of reaction, ease of breaking up habits, readiness to make snap judgments and independence in the face of majority influence more evident in individuals of radical temperaments than among conservatives.

Kretschmer (27) correlated sensory and perceptual differences with constitutional types.

Bensheim (3) correlated differences in the effects of mescal intoxication with the psychothymic and schizothymic groups.

Individual differences in motor coördination, as exemplified in handwriting, mirror-drawing, and speech, were used by June Downey (10) as indications of individual differences with regard to temperamental traits.

The relation of range and degree of fluctuation of attention to constitutional type was experimentally tested by Reiter and Sterzinger (55). The results indicated some relationship between the range of attention and the

types of Kretschmer, but this relationship was not marked.

Collins (7) working with repeat tests of the Pressey Form B test, did not find consistency of results when he gave the tests to the same individuals after intervals of a week and a year, and concluded that the Pressey Form B test did not test a constitutional factor.

Emotional and intellectual reactions to ink blots have been used by Rorschach and others as guides to temperamental differences.

As illustrations of the application of the constitutional type concept to physiological mechanisms we have the attempt to correlate personality and intellectual characteristics with general body build, pyknic, athletic and asthenic types of Kretschmer (27), and Schmidt (56), and Graf (18), with rate of growth, (50), with height-weight relationships (16), with somatograms and cephalograms (52), with sugar content of the blood (29), with the chemical balance within the body (34), and with the results of isoagglutinin blood tests (14).

In some instances individuals have been accepted as belonging in one or another classification of constitutional type and experimental attempts have been made to arrive at a cataloguing of characteristics belonging to this type which could be used for the purpose of diagnostic identification of the type in the case of other individuals.

Enke (12) studied the motor processes of 250 people whom he had classified according to the Kretschmer catagories. The members of the pyknic group were characterized by motor expressions of continuous internal feelings of tension. They were less skillful in fine hand movements than leptosomes, and were not so well able to isolate individual fine movements within the attention field. In another study Enke (14) investigated the relation between motor peculiarities and bodily morphology, using 500 male and female subjects, whose ages varied from sixteen to sixty-five, and who showed a wide degree of variation in intelligence and training. The subjects were again grouped according to the Kretschmer classification. Tapping, breathing technique, tests for steadiness, speed and accuracy of motor coördination were used. The author finds a slower tempo and greater pattern irregularity of movement in pyknics. Pyknics, however, adapt themselves better to changed movement sequences. He feels that psychomotor factors are valuable indices of constitutional type.

Gourewitch and Ozeretzki (17) examined 8,167 people and chose 4,858 cases whom they felt were clearly recognizable examples of the following constitutional types: the leptosomic, athletic, pyknic, infantile, and dysplastic. The others they discarded as being of mixed type. Correlations were sought between character and motor ability, between somatic constitution and motor ability, and between bodily constitution and character. The authors found that the psychomotor ability was distributed among four types as follows: the psychothymic pyknic, the schizothymic leptosomic, the athletic epithymic, and the infantile labile.

Neeb (38) placed individuals in temperamental groups on the basis of

Kretschmer's classification, and sought to arrive at a descriptive concept of the types through intelligence tests, school grades, and ratings of vocational aptitudes. No clear-cut descriptive concept of these types was arrived at.

Sorokhtin (57) chose a group of children of school age whom he characterized as brake-type on the basis of their behavior under experimental conditions for conditioning the pressure of the hand on a key to a red light combined with electric currents. When the children had been diagnosed in this manner as to type their general personality and behavior characteristics as revealed by observation in school and medical examination were catalogued as descriptive of this brake-type. According to the authors the following interpretation is characteristic of this type: in the motor sphere, swiftness of action, normal or lower than normal; regularity and strength are high; the tempo of action is low and even; dynamic durability is normal and static durability higher than normal. The characteristics of these children in pedagogical situations are consistent within the group (may be termed socially stable) and may be described as follows: (1) They have good discipline. They actively support order and distinguish themselves as being reliable in responsible work; any flaw in their adherence to discipline could be traced to an outburst of negativism; some subjects of the group were very stubborn, but this did not interfere with the success of the social contact with their companions. (2) They display ability for long-time concentration in their work (3) They are very persistent and always finish their task. (4) They are independent in their work. (5) In new work they are slow to orientate and inclined to be slovenly. (6) They do work with moderate or slow speed, with even tempo, and with accurate execution. (7) Emotionally they are reserved and they are moderate in character. (8) Non-sociability or introversion is an outstanding trait of the whole group.

Yarmolenko (66) on the basis of tests of motor coördination which included throwing of balls, striking of sand-bags and walking along a straight line and along circles, following directions as to speed and change of motion, and jumping, worked out a motor profile correlated with age of the children. These children were then grouped into those of brake-type, plastic type, and excitable type, on the basis of the reflexological diagnosis used by Dr. Sorokhtin and the motor profile studied from the point of view of type differentiation. He arrives at the conclusion that the excitable type gives a wide variation of the age coefficient in the direction of plus and minus. The force of the impact and the over-jump is large, but continuous muscular exertion is difficult. Their endurance is not very good. The brake type moves more slowly but more accurately and with greater sureness. Force and endurance are high in this type. The plastic type does not give a typical relationship between coefficients. The author feels that a priori an individual's motor profile should bear the traces of brake or excitable type, according to the type toward which he is more inclined.

One cannot consider the work which

has been done on constitutional type without being struck by the following facts: many of the classifications are of kinds of behavior rather than sorts of people. This gives rise immediately to the difficulty of mixed types. Certainly a grouping of people which leaves 50 per cent outside any of the groups can offer no substantial assistance to the diagnostitian, nor any hope of arriving at a clear-cut symptomatic description valuable for prognosis. A classification which breaks down frequently into mixed types appears to be a classification of aspects of the behavior of people rather than a classification of people. A large number of borderline types is conceivable in a satisfactory classification of constitutional types, but a large number of mixed types is in itself strongly suggestive of the unsoundness of the classification concept which necessitates this inclusion in its system.

There are classifications to which this objection does not apply, and these more nearly approach a true segregation of people into group types. But even these classifications seem too broad in their original delineation. Differentiation is drawn between groups of traits and type names given to these characteristic groups, without first determining definitely that the constellations of traits characterized as constitutional types include only constitutional traits. It is as if we were to say that a combination of blue eyes, short hair, dark skin, well manicured finger nails, small bones and an upright carriage constitute a type we might call Celtic. These are all physical characteristics in regard to which adults differ, and conceivably we might find many individuals who would fit this exact description in regard to all of these particulars. But inasmuch as variation in regard to grooming of finger nails, posture, and length of hair (none of them constitutional traits) would prevent inclusion of individuals in the group, we could not properly designate the group as an authentic constitutional type. The Celtic type, for instance, is a genuinely recognizable racial type, but it is described in terms of color of hair, color of eyes, and complexion. These are all constitutional physical characteristics. In order to have a Celtic type, one must have these in a given quality and a complete group. Any one of these characteristics may be found outside the Celtic group, but when we have lost one of them from the group we have lost the Celtic type. But no matter how variously scattered these constitutional characteristics may become through hereditary mixture and diffusion, whenever, through the mechanics of heredity, they are again all reassembled in one individual, the Celtic type is restored to us.

It would then appear necessary, before arriving at a classification of temperamental or constitutional types, to determine first what individual constitutional traits are involved in temperament, and then it may be possible to arrive at groupings of these traits which will be found to be shared as characteristic groupings by large numbers of people. The confusion of constitutional and non-constitutional characteristics is especially evident in those studies which attempt to arrive at symptomatic psychological

descriptions of hypothetical types. In this connection all sorts of behavior have been catalogued with no regard for the question as to whether this behavior represented constitutional psychological traits. There may, indeed, be some question as to whether it is possible to determine the constitutional character of any psychological trait which may be properly described as a quality common to the whole personality. But surely until this fundamental question is answered we have no right to include traits in symptomatic descriptions of constitutional type merely because they are of psychological quality. Such functions as steadiness, speed and accuracy of motor coördination may in the end be proved to be constitutional, but in view of the fact that even casual observation shows that these functions vary widely in one individual from day to day and from year to year, their constitutional character must be proved and not assumed.

The first problem facing those now working in the field of temperament and constitutional type seems to be to discover functions of the nervous system which are authentic constitutional traits, and to devise ways of measuring individual differences in these traits. Later, characteristic groupings of these traits may be found which will form true temperamental categories in which people can be placed with surety that those in any one category resemble each other in a manner genuinely constitutional. The studies of eidetic imagery come nearest to meeting this requirement up to date; but indications of profound differences between the childhood and adult experiences of individuals possessing eidetic imagery leave us in some doubt as to the constitutional character of this phenomenon. It seems entirely possible that all people may experience eidetic imagery at some time during their lives and quantitative differences in its persistence into adult life may not be constitutional in their nature.

McDougall (34) in pointing out that previous classifications have not analyzed the constituent factors of types, offers the following analysis of groups of such factors: (1) intellect (memory imagery); (2) disposition (affective); (3) temper (drive); (4) temperament (endocrine); (5) character (acquired organization of affective tendencies). While he feels that Jung ascribes too much significance to the introvert and extrovert differentiation, and that this emphasis leads to confusion, McDougall himself presents the extrovert-introvert scale for singling out as a constitutional personality factor, and discusses this difference as one which involves inhibition. In the case of the introvert he believes the lower levels of the central nervous system are subject to a high degree of inhibition by cortical activity. According to his drainage theory of inhibition the excitation of the thalamic centers (constituting emotion) is directed to the cortex and sustains activity there. With increasing maturity of the organism greater cortical control develops, and the individual becomes correspondingly more highly introvert.

The terms introversion and extroversion express the limits of individual variation of the degree of freedom with

which this affective overflow takes place; and this variation McDougall assumes to be constitutional. He postulates an unknown substance in the nervous system similar in its effect to alcohol or chloroform, which sets up excitation. The extrovert would be an individual who had unusually little resistance to this substance, and is perpetually in a state of mild intoxication.

Other authors have been interested in inhibition as a constitutional factor offering individual variations. Pavlov (46) demonstrated that inhibitions could be conditioned, and believes he has evidence that individuals display a basic difference in the readiness and ease with which this conditioning of inhibition takes place within the organism. He describes the over-excitatory individual as one in whom inhibitions are conditioned seldom and with great difficulty. The over-inhibitory type is the type in whom inhibitions are conditioned too easily for perfect adaptation to a changing environment. Between these extremes lies the plastic group, in whom inhibitions are set up with sufficient ease to assure protection, but not to the extent which prevents adaptation. This variation, which he regards as constitutional, he correlates with hypothetical physiological processes within the central nervous system.

Hunt (21) emphasizes a difference in susceptibility to inhibitive processes in drawing the lines for his classification of people into those of erethitic type and kolytic type. The erethitic type possesses cortical excitability and the kolytic type is characterized by cortical inhibitability. He accepts the conclusions of Meltzer (35) that both excitability and inhibition are characteristic of living matter. Inhibition he sees as a suspension of physical activity. While processes of excitability and inhibition have a share in all neural functioning, individuals differ from birth in degree of excitability. These differences have been ascribed variously to differences in chemical, glandular and metabolic activities of obscure nature. Hunt himself postulates a specific cell which functions for inhibition. Those individuals who possess a preponderance of these cells form the over-inhibitive group, variously designated as schizoids, schizophrenics, and by Hunt as kolytics. A lack of these cells means over-excitability, and places the individual in the manic-depressive, cycloid group,called by Hunt erethitics. Hunt describes the erethitic as follows: "Great activity of mind and body. Responsive, impulsive, easily excited; quick-tempered, highly emotional and inclined to be restless. Mercurial; rash; hasty in action; psychic tempo is rapid; distractible, not easy to concentrate; more in reality; action and expression; friendly, sociable, accessible."

If one were seeking for investigation a single factor which might be a constituent of those broader differences subsumed under the term "constitutional type," variations in susceptibility to inhibition surely offer themselves as suitable. It is a factor which can be isolated as a psychological entity and which colors the whole personality in many situations occurring throughout the lifetime of the organism.

Individuals can be compared as to

the relative speed with which inhibitions can be conditioned. This comparison also offers a continuous range of quantitative measurement which may be contained between two extremes. If the position upon the scale of measurement of this function can be shown to be consistent within the experience of one individual, we are one step further toward the solution of the problem as to whether or not it is a constitutional trait. Its measurement permits classification and if it should prove to be inborn it could be accepted as one temperamental trait, and an ingredient in a future group classification.

Theories as to the physiological mechanism of inhibition are numerous, but not relevant to our own primary problem, which is the demonstration of individual quantitative differences in the ease with which inhibitions are set up, and the basic consistency of these differences within the temporal experience of these individuals. The term "inhibition" itself has been used in various connotations: The Freudian use of the term refers primarily to conduct and incapacity. Used by Pavlov and those of the Russian school and their followers in other countries, the term refers to a neuro-psychological process set up under experimental conditions clearly defined by them. It is used widely among those writing in the field of social psychology and sociology as applied to self-restraint of conduct with special reference to its social acceptability. The term is also used in connection with the phenomena of memory and forgetting, and experiences which cannot be recalled are said to be inhibited. In all of these varied uses, there is a common core of meaning which perhaps may best be described by the word "stopped." As the term is used in connection with our own experimental work herein reported, we understand it to mean a delay or cessation of activity in the face of conditions which have previously called out the activity and which remain sufficiently uniform to justify the expectation that the activity would remain uniform; said delay or lack of activity being explicable only in terms of factors internal to the acting organism.

Method

In devising our own technique for attacking this problem, we sought for an inhibition which could be conditioned under experimental conditions applicable to children of a wide age range. These experimental conditions also had to permit sufficient variability in the conditioning of the inhibition to disclose the types we were seeking, if they existed. This necessarily meant that we use an experimental situation which would result in a conditioned inhibition only if the internal situation of the subject were favorable to such conditioning. In preference to the unconditioned stimuli setting up strongly inhibitory reactions, such as electric shocks, etc., we purposely chose a situation which would have a weak tendency to condition an inhibition. The new conditioning in an experimental setting of a verbal inhibition already established seemed the best instrument for this purpose. It had a disadvantage in that it could only be used with children who had reached an age at which we could

depend upon the verbal inhibition having been established. The verbal inhibition seemed to meet the requirements in all other ways so completely that we accepted this disadvantage and undertook to work out an experimental setting for the conditioning to a new stimulus of an inhibition previously conditioned to verbal commands.

We used a "Marietta" reaction time apparatus which offered as a stimulus for the pressing of a button either a white light, a green light, a red light or a buzz. The subject's reaction time was measured in hundredths of a second by the chronoscope belonging to the Marietta instrument, and recorded immediately on a chart. This reaction time apparatus has a screen between experimenter and subject, which allowed two experimenters to work behind it unseen by the subject. One experimenter manipulated the switches which controlled the stimuli and the other read and recorded the chronoscope readings.

The apparatus is furnished with two response keys, only one of which was used. The subject was always left free to make a choice as to whether to use the right or left hand for response pressure.

A fixed series of stimuli presentations was made up in advance. These series varied in internal sequence and length with different groups of subjects and the series used with each group will be presented in its turn. In each series there was one type of stimulus to which the subject was told not to respond at all. Unknown to the subject, this stimulus for which the inhibition was established verbally was always preceded by the same stimulus chosen from the other two lights. Green was usually the color for which response was omitted by instruction. If white were chosen for the other color it always appeared before the green and if red were chosen it always appeared before the green. By placing one color uniformly in the position which immediately preceded a color for which we had established an inhibition through verbal instructions, we hoped to condition this inhibition to the precedent color. Therefore, the color which preceded the green in any given series is referred to as the conditioned color. Except for the green and the conditioned color the reaction time stimuli were arranged for each series in an eccentric sequence. Both adults and children were used as subjects. The instructions were the same for both.

When the subject was seated before his side of the apparatus he was told by the experimenter: "Let's use this one here" (indicating which response key was to be used). "Now we want you to watch this opening. When you see a red light in there, then we want you to press down on this just as quickly as you can after you see the light." At this time the second experimenter showed a red light and the subject responded. The same procedure was used for the white light and the buzzer, and for the green light except that the subject was told not to respond to the green. After these instructions had been given the experimenter said, "All right, now we are going to do some more. Remember that you press down for red light,

the white light, and the buzz; but not for green."

RESULTS

Experimental Series No. I

The object of this experimental series was to discover whether, under the conditions set up, the inhibitions established verbally to the green stimulus would be conditioned to the color which always preceded green. We were also interested to know whether this would happen in every case in the same degree, or whether there would be enough variation to permit the formulation of a measuring scale including some cases where the inhibition was not conditioned at all. These latter cases would represent the zero of the measuring scale.

Method of scoring. In this experimental series, all reaction times to all the stimuli were recorded as they were measured by the chronoscope in hundredths of a second. Because we were interested in comparing the effect of the experimental conditions on the reaction time of individuals, and not interested in comparing absolute reaction times, we calculated for each series the difference between the initial reaction time for a given type of stimulus and each subsequent reaction time for that type of stimulus. If a subsequent reaction time were larger than the initial one, we called the difference a positive difference; if a subsequent reaction time were smaller than the initial reaction time, we called the difference a negative difference. For instance, if the first reaction time to white were 82, then the differences between 82 and all the other reaction times to white in a series as given to one individual at one sitting would be calculated and arranged on a chart in the order of their presentations in the series, the positive differences being placed above a zero line, and the negative differences below. Opposite the beginning of the zero line was noted the absolute initial reaction time. This method of recording made it possible to make comparisons of the progress of the reaction time (whether it grew longer or shorter) in the case of the different types of stimuli used for any one individual in one sitting, and in the case of the same type of stimulus used with different individuals.

One hundred ninety-eight stimuli comprised each series presented in this experimental group. The following sequence was repeated six times to form the series: white, green, buzz, white, green, red, white, green, buzz, white, green, red, buzz, white, green, buzz, white, green, red, buzz, red, white, green, red, white, green, red, buzz white, green, buzz, white, green. In this sequence white invariably preceded green, and was the conditioned color. There were 84 subjects in this group. Most of them were college students; a few were members of the faculty; and ten were children.

The progress of the reaction times for each type of stimulus and for each individual, as shown by the differences between initial reaction time and subsequent reaction times to the same type of stimulus, was plotted in graph form for purposes of comparison. It became evident from a study of the graphs that the majority of the reaction times increased in length toward the end of the test. However, the

increase in the case of the conditioned color (that color which invariably preceded green) was greater than the increase in the case of the other stimuli. A statistical evaluation of the increasing length of the reaction time in the case of each kind of stimulus was made as follows: the number of spaces above the zero line for each response to white, to red, and to the buzz, was counted; these were totaled. averaged and recorded for each stimulus. The correlation between the conditioned color and the non-conditioned color was .05. The correlation between the conditioned color and the buzz was −.067. The correlation between the non-conditioned color and the buzz was −.45. We interpreted this to mean that the behavior of the conditioned color differed more from that of the non-conditioned color and from that of the buzz than the behavior of the non-conditioned color and that of the buzz differed from each other. These results suggested the possibility that the reaction times to the conditioned color were being affected by its position which invariably immediately preceded the green.

The procedure outlined was repeated with a different group of 37 subjects, again chiefly composed of college students and members of the faculty. The stimulus sequence presented to this group was exactly like that presented to the former group, except that the red and white were interchanged. This placed the red in the position of the conditioned color, invariably preceding green. The statistical results for this group were as follows: the correlation between the conditioned color and the non-conditioned color was .16; the correlation between the conditioned color and the buzz was −.15; the correlation between the non-conditioned color and the buzz was −.31. Again we found that the difference in behavior between the conditioned color and either the non-conditioned color or the buzz was greater than the difference in behavior between the non-conditioned color and the buzz.

A comparison of the two groups shows that the behavior of the conditioned color as related to that of the other stimuli was similar, whether red or white occupied the position invariably preceding green. From this we inferred that the unusual lengthening of the reaction time for the conditioned stimulus in the course of any given series was due to its position preceding the stimulus to which we had verbally set up an inhibition. In the case of the buzz we found that it had a startling effect which made its character as a stimulus differ so much from that of the colors that we did not attempt to compare it directly with the colors as a conditioned stimulus.

When we combined the results of both groups, we obtained the following statistical results: correlation between the conditioned color and the non-conditioned color, −.10; correlation between the conditioned color and the buzz, .077; correlation between the non-conditioned color and the buzz, −.34.

A further analysis of these results was made to establish corroborative evidence in favor of the inference that the behavior of the conditioned color varied from that of the other

stimuli and that this variation was attributable to its position preceding green. The results of this analysis were as follows:

	cases
Conditioned red lengthened more than non-conditioned white	29
Conditioned red lengthened less than non-conditioned white	7
Conditioned white lengthened more than non-conditioned red	20
Conditioned white lengthened less than non-conditioned red	13
Conditioned red lengthened more than buzz	32
Conditioned red lengthened less than buzz	5
Conditioned white lengthened more than buzz	27
Conditioned white lengthened less than buzz	6
Conditioned white increases from starting point	25
Conditioned white decreases from starting point	8
Conditioned red increases from starting point	31
Conditioned red decreases from starting point	55
Non-conditioned white increases from starting point	20
Non-conditioned white decreases from starting point	16
Non-conditioned red increases from starting point	20
Non-conditioned red decreases from starting point	13
Conditioned color increases from starting point	56
Conditioned color decreases from starting point	13
Non-conditioned color increases from starting point	40
Non-conditioned color decreases from starting point	29
Buzz increases from starting point	15
Buzz decreases from starting point	54
Conditioned red increases as non-conditioned white decreases	14
Conditioned red decreases as non-conditioned white increases	3
Conditioned white increases as non-conditioned red decreases	9
Conditioned white decreases as non-conditioned red increases	3
Buzz and non-conditioned white decrease as conditioned red increases	10
Buzz and non-conditioned red decrease as conditioned white increases	6
Buzz and non-conditioned white increase as conditioned red decreases	0
Buzz and non-conditioned red increase as conditioned white decreases	1
Buzz and non-conditioned color decrease as conditioned color increases	16
Buzz and non-conditioned color increase as conditioned color decreases	1
Buzz and conditioned red increase as non-conditioned white decreases	4
Buzz and conditioned white increase as non-conditioned red decreases	3
Buzz and conditioned red decrease as non-conditioned white increases	3
Buzz and conditioned white decrease as non-conditioned red increases	3
Buzz and conditioned color decrease as non-conditioned color increases	6
Buzz and conditioned color increase as non-conditioned color decreases	7
All decrease	5
All increase	6
Buzz increases as non-conditioned color and conditioned color decrease	1
Buzz decreases as non-conditioned color and conditioned color increase	28

It seemed clear that this experimental set up produced in some individuals a conditioned inhibition, as evidenced by increased length of the reaction time for the conditioned stimulus during the course of an experimental series. A study of the individual records for the members of these groups as they were presented in graphs indicated some individual difference in the behavior of the conditioned color, and our next step was to investigate the scope of this individual difference by repeating the experiment with large numbers of school children.

Experimental Series No. II

We had already found, in the course of Experimental Series No. I, that our sequence of 198 stimuli was longer than necessary. If a conditioned inhibition could be produced in a subject by this technique, the fact became evident during the first sixth of the series. For a part of Experimental Series No. II we used the original series sequence of 198, which presented the conditioned color 30 times; during the latter part of Experimental Series No. II we shortened the stimulus sequence to 33, which presented the conditioned color ten times before the color green. The same sequence was used that was used in the longer series. Comparisons, which will be given later, between the results of the long and short series, showed that the short series which included ten presentations of the conditioned color, was as effective as the long series of thirty presentations of the conditioned color, in producing a conditioned inhibition.

Throughout the work with the subjects in Experimental Series No. II, red and white were used interchangeably and at random as a conditioned color. Otherwise the stimulus sequence was always the same.

Because the objective of Experimental Series No. II was the investigation of the range of individual differences in the behavior of the reaction times for the conditioned color, we recorded and studied only the reaction times for the color which was being used as the conditioned color.

The subjects for Experimental Series No. II were children in two grade schools. We used the first three grades of one school and the last three grades of another. The apparatus was set up in the nurse's room at the school building, and the children were sent one at a time by the teacher from the school room to the nurse's room. Two experimenters worked with each child; while one experimenter presented the stimuli, the other read the chronoscope and recorded the reaction times to the conditioned color on a chart (see figure 1). The figures along the vertical edge of the chart refer to time. Each spacial unit represents a time interval of four hundredths of a second or forty sigma. The horizontal spacing represents the sequence of ten presentations of the conditioned color. The area above the zero line represents the amount of difference between the initial reaction time (measured in hundredths of a second) and the subsequent reaction time (measured in hundredths of a second) when the subsequent time is the greater. This is termed the positive difference. The area below the zero line represents the difference between

the initial and subsequent reaction times when the subsequent time is the shorter, and is termed the negative difference. The initial reaction time is represented by the zero line. At the top of the page were also noted the name and age of the child, and the date of the experiment. Three hundred fifty-nine subjects were used.

The total number of differences between initial and subsequent reaction times for this series were plotted on one sheet of graph paper. Zones were established for these differences. The middle zone represented the area within which 50 per cent of the reaction time differences fell. This zone extended above the zero line, to points which lay between twenty-one and twenty-eight hundredths of a second for each presentation, and below the zero line to points which lay between fourteen and twenty-three hundredths of a second for each presentation. Twenty-five per cent of the difference times lay above this zone in the positive field, and 25 per cent lay below in the negative field. This middle zone may represent, then, the average area for difference times, and is represented by the shaded area on the chart (fig. 1). Individuals whose graphs fall within this area may be said to be making an average performance with this experimental set up. Those whose graphs fall in the positive area above this zone may be said to show an unusual capacity for conditioning an inhibition under these experimental circumstances. Those whose graphs fall in the negative area below the average zone may be said to have less than average tendency to the conditioning of an inhibition in this experimental set up.

When these zones were established the question naturally arose as to whether they represented a true differentiation between individuals, or the accidental grouping of a mass of difference times. Five individual graphs were chosen at random whose first reaction time differences following the initial reaction times were zero. Five others were chosen whose first reaction time differences after the initial reaction times lay between 0 and 10 above; five more were chosen whose first subsequent reaction time differences lay between 10 and 20 above zero; and so on until each group of ten hundredths of a second between 80 above and 80 below was represented by five individual graphs, according to the placement of the first reaction time difference following the initial reaction time. A study of these graphs showed that those individual records which originated within each of the three zones consistently maintained their zone placement. Table 1 gives the figures for these groups of individual records. It must be remembered that in all cases the reaction time figures represent differences between the initial time and subsequent reaction times as measured in hundredths of a second.

Our next step was to divide all the records into three groups according to the zones in which they originated, and to establish the medians for each zone as shown in figure 2, which shows the relation of the medians to the zones.

The records for Experimental Series No. II were also divided into age

Name_____ Date_____ Age_____

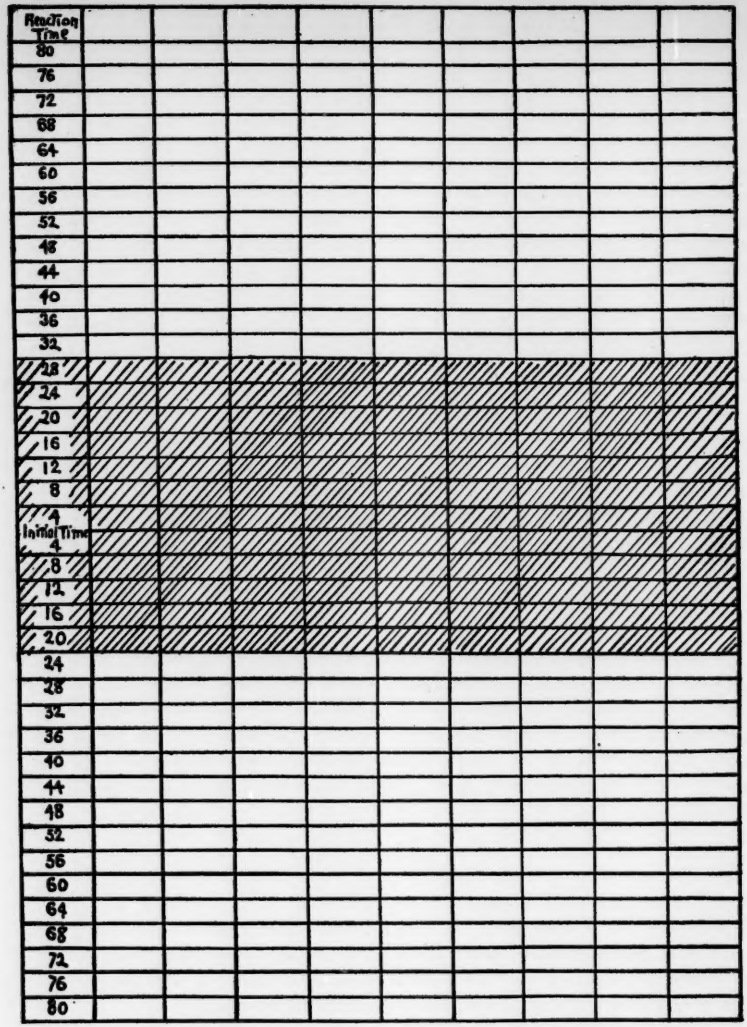

FIG. 1. RECORD CHART FOR REACTION TIMES FOR CONDITIONED COLOR

Numbers along the vertical edge of the sheet refer to time. Each spatial unit represents a time interval of four hundredths of a second.

The middle line marked "Initial time" represents the first reaction time for the conditioned color (zero line).

The horizontal spacing represents the sequence of ten presentations of the conditioned color.

The area above the zero line represents positive difference (see text). The area below the zero line represents the negative difference (see text).

The shaded area represents the middle zone or average performance (see text).

The area above shaded area represents an unusual capacity for conditioning of inhibition.

Area below shaded area represents less than average tendency to conditioning of inhibition.

TABLE 1

Individual reaction time records

RANGE OF THE REACTION TIME FOLLOWING THE ZERO REACTION TIME	UPPER LIMIT OF RANGE OF GROUP	LOWER LIMIT OF RANGE OF GROUP	REACTION NUMBER								
			2	3	4	5	6	7	8	9	10
80	+89	−15	79	27	28	41	49	5	13	16	3
to			76	−3	−6	78	5	89	−3	77	71
70			75	22	64	39	33	33	49	−3	48
			73	33	4	14	74	33	19	61	30
			71	−15	62	−14	68	53	64	60	60
70	94	15	65	49	89	73	63	15	89	70	50
to			64	67	68	73	87	25	73	65	47
60			63	17	29	93	78	24	40	31	32
			63	60	22	34	26	42	40	24	31
			62	25	94	27	77	42	59	48	62
60	97	1	55	9	38	52	39	27	17	38	32
to			55	39	19	52	37	35	55	14	47
50			54	34	97	60	40	58	37	37	25
			52	50	55	30	42	59	37	41	28
			51	29	23	36	18	38	1	24	29
50	59	−12	49	30	40	59	41	28	37	30	−1
to			47	−12	43	9	−1	−11	17	23	−1
40			45	21	20	17	15	46	28	28	−2
			42	32	44	36	11	52	41	49	49
			42	52	25	2	27	42	11	0	12
40	54	−25	38	29	−9	−14	20	6	23	8	−2
to			36	42	17	11	32	20	25	15	27
30			34	41	29	49	29	54	20	31	36
			32	31	31	33	28	25	24	23	26
			31	−8	4	45	−25	−6	−15	19	−15
30	48	−7	28	24	38	35	24	46	30	33	45
to			27	23	20	27	37	24	34	13	0
20			26	−6	24	31	48	−2	30	−2	16
			26	2	4	14	−2	31	9	24	6
			23	23	21	39	28	−7	23	20	3
20	32	−21	17	−19	−9	2	−18	−20	−10	−1	−17
to			15	−15	−2	−10	−18	3	−21	−17	−16
10			15	11	3	10	2	−6	16	6	−7
			15	13	24	5	−2	25	22	−17	−8
			10	24	7	9	14	14	17	29	32

TABLE 1—*Continued*

RANGE OF THE REACTION TIME FOLLOWING THE ZERO REACTION TIME	UPPER LIMIT OF RANGE OF GROUP	LOWER LIMIT OF RANGE OF GROUP	REACTION NUMBER								
			2	3	4	5	6	7	8	9	10
10	29	−22	7	12	20	15	10	29	10	−10	16
to			6	13	23	23	12	20	24	25	18
0			5	5	−1	4	5	−17	13	3	−22
			2	5	−1	21	−5	7	−9	−8	16
			1	19	18	23	1	16	9	20	1
0	+72	−72	0	2	−8	−3	−72	−1	3	−10	−6
			0	−11	−2	−9	−3	−8	−8	−14	−27
			0	−4	−11	13	−12	−21	−32	0	0
			0	0	0	65	65	15	72	15	60
			0	−6	−70	−10	4	−7	8	4	−8
0	28	−39	−1	−6	−4	−3	5	−3	11	8	0
to			−2	3	−11	14	27	25	14	28	−39
−10			−3	19	−5	4	−4	−4	−4	−11	−1
			−7	−6	−14	−21	−26	−13	−12	−6	−12
			−9	11	−10	−17	17	10	−7	8	−13
−10	20	−45	−10	−24	20	9	−8	−8	−17	−5	−45
to			−15	−19	−7	−19	−2	−23	−4	−16	4
−20			−15	−5	−7	−5	−9	−11	2	8	−1
			−16	−22	7	7	−27	−6	−16	−7	−3
			−17	−17	−41	−15	−7	−8	−19	−22	−11
−20	19	−76	−20	−25	−29	−9	−16	−18	−30	−39	−16
to			−20	−10	−5	−7	−10	13	3	−15	0
−30			−23	−16	−3	−56	19	−76	7	−67	14
			−27	−53	−30	−44	−27	−51	−32	−25	−12
			−29	−9	−7	−17	−26	−2	−19	−30	−49
−30	4	−159	−31	−40	−43	−41	−41	−45	−51	−57	−24
to			−34	−9	−19	−76	−69	4	−9	−40	−27
−40			−36	−32	−27	−12	−21	−17	−21	−35	−30
			−36	−93	−106	−13	−92	−26	−73	−113	−63
			−39	−47	−56	−56	−70	−153	−132	−155	−159
−40	6	−81	−42	−50	−65	−40	−33	−56	−48	−42	−27
to			−43	−39	−46	−35	−54	−54	−51	−59	−62
−50			−44	−35	−38	−49	−45	−45	−53	−30	−41
			−45	−81	5	6	−45	−3	−4	5	−30
			−48	−57	−55	1	−75	−75	−75	−10	−71
−50	30	−65	−51	−31	−64	26	−56	−52	−8	12	0
to			−51	−45	−51	−15	−12	−38	−30	−48	−55
−60			−52	−65	−53	−60	30	−60	−60	−65	−60
			−57	−20	−60	−59	−58	−61	−4	−14	3
			−60	−39	−28	27	−51	−46	1	30	−56

TABLE 1—*Concluded*

RANGE OF THE REACTION TIME FOLLOWING THE ZERO REACTION TIME	UPPER LIMIT OF RANGE OF GROUP	LOWER LIMIT OF RANGE OF GROUP	REACTION NUMBER								
			2	3	4	5	6	7	8	9	10
−60	20	−80	−61	−65	11	14	11	−59	−55	−33	17
to			−63	−72	−8	11	15	13	−63	−54	12
−70			−67	−76	−80	−18	−15	7	10	4	3
			−70	−1	−71	−68	12	−79	−80	−53	−41
			−70	−68	−7	15	14	−79	2	17	20
−70	19	−100	−73	3	−82	−15	19	−82	3	−1	−26
to			−74	−4	−20	−74	−64	−56	−82	−15	−13
−80			−76	−61	−69	−16	−5	−21	−54	−31	−69
			−78	−90	−8	−18	−100	−39	−94	−24	−4
			−78	−6	−8	−98	−18	−14	−91	−13	−15

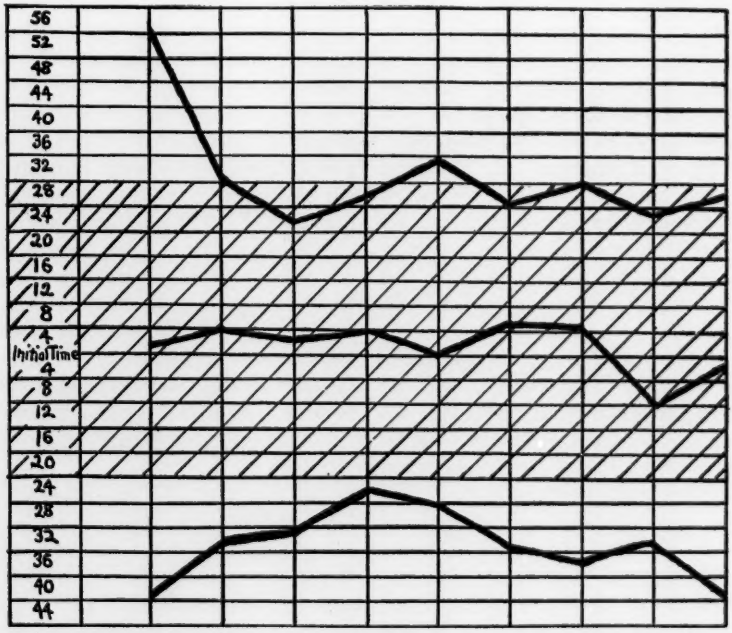

FIG. 2. MEDIANS FOR RECORDS ORIGINATING IN EACH OF THE THREE PERFORMANCE ZONES

Shaded area represents zone of average performance. Area above shaded area represents unusual capacity for conditioning of inhibition. Area below shaded area represents less than average tendency to conditioning of inhibition.

Figures at vertical edge of record sheet represent time intervals in hundredths of a second. Horizontal spacing represents the sequence of presentations of conditioned color.

Graphs are plotted in terms of differences between initial reaction time to conditioned color and subsequent reaction times to conditioned color.

groups. The correlation between age and amount of conditioning for children within school grades one to six was −.25, which is not enough to indicate any effect of training upon the susceptibility to the conditioning of inhibition under these experimental circumstances.

It has already been noted that in part of the experimental series with the school children we used a smaller number of stimuli than was used in the Experimental Series No. I, which established the fact that it was possible to produce a conditioning of inhibition under these experimental conditions. The validity of the short series as an index to the susceptibility of a given individual was established in the following manner. Only the results for those individuals to whom the full series of 198 stimuli was given were used for this computation. First, the average difference between the initial reaction time for the conditioned color and the first nine subsequent reaction times for the conditioned color was calculated for each individual and designated positive or negative according to whether it was above or below the zero line. This average will be referred to in the future as the "partial average." Second, the average difference between the initial reaction time and all thirty-two subsequent reaction times was calculated for each individual and designated positive or negative. This will be referred to in the future as the "total average." Third, in those cases in which both averages (the partial average and the total average) were either positive or negative we calculated what percentage the partial average was of the total average. The final average of these percentages was 103.3 per cent. This means that the average amount of difference between the initial reaction time and the first nine subsequent reaction times for the conditioned color is 103.3 per cent of the average difference between the initial reaction time and all of the subsequent reaction times. In other words, as much or more conditioning of the inhibition takes place during the first nine subsequent repetitions of the conditioned stimulus as takes place in the course of thirty-two repetitions. In 91 per cent of the cases the partial difference and the total difference were in the same direction. In 90 per cent of those cases in which the partial and total differences were in opposite directions the total graph for the individual remained entirely within the middle zone. These cases were individuals whose curves lay so close to the zero line that the crossing back and forth between positive and negative could not detract from the validity of the first nine subsequent reaction times as an index of the zone placement. Only in the case of one individual did the partial and total differences vary in such a manner as to give different zone placements for the partial and total results.

The fact that the zone placement for individual graphs is in the main consistent with the zone placement of the first subsequent reaction time, and the fact that a series of 9 subsequent reaction times constitutes a valid basis for zone placement of an individual, are in line with the current disposition to believe that conditioning takes place with one repetition, if at all.

In connection with Experimental Series No. II we were also interested to know whether index as to zone placement of the individual could be furnished by the initial reaction time. On the basis of our previous results we assumed the first subsequent reaction time to be an index of zone placement, and computed the correlation between the initial reaction time and the first subsequent reaction time for the conditioned color. The correlation was −.13, indicating that the absolute speed of motor reaction is not an index of the susceptibility of the individual to the conditioning of inhibition under these experimental conditions. The individual who is impulsive in his movements, physically "quick on the trigger," and rapid in his absolute reaction time, is not necessarily the excitable type of individual in the sense that he lacks average capacity for forming conditioned inhibitions in this experimental situation.

Experimental Series No. III

This series was undertaken to obtain data bearing on the degree of consistency of results with this experimental technique for a given individual during a series of repeated tests extending over a period of time. For subjects we used a group of 10 college students—9 girls and 1 boy. Each of these 10 subjects was given repeated tests with intervening time intervals of three days to three weeks. The progress of the time intervals was kept as nearly uniform as possible for the ten subjects.

In order to minimize practice effect during these repeated tests we used each of the 3 colored stimuli (white, red and green) only twice as the conditioned color. Because the non-conditioned color could conceivably be weighted with a practise effect in the direction opposed to the conditioning of an inhibition we arranged the series in such a manner that the non-conditioned color for each series was the conditioned color for the next series. The following table shows the rotation of the colors:

	SERIES NUMBER					
	1	2	3	4	5	6
Conditioned color....	W	R	G	W	R	G
Verbally inhibited color.....	G	W	R	G	W	R
Non-conditioned color.....	R	G	W	R	G	W

The results of the repeated tests for these ten subjects are presented in table 2. It will be observed that in the main the results of the repeated tests for any given individual show a high degree of consistency with regard to zone placement.

We were fortunate in being able to repeat this test in February of 1934 with 17 of the school children who had taken the test in the fall of 1931. Because of the great time interval we assumed there would be no appreciable practise effect carried over to the second test and used the identical stimulus sequence used in the first test, thus making the two tests directly comparable. The comparison of the results of the first test with those of the second test for each child are presented in table 3.

We were also able to repeat the experiment with seven of the original

TABLE 2

SUBJECT	DATE	REACTION NUMBER								
		2	3	4	5	6	7	8	9	10
1	Nov. 24	−9	−25	−18	−16	−21	−23	−24	−30	−29
	Nov. 29	50	49	−29	50	52	51	50	−14	−1
	Dec. 5	37	31	15	2	−14	−18	−11	−19	−16
	Dec. 8	−40	−62	−45	−50	−47	−55	17	−54	18
	Dec. 15	−18	−7	−11	−16	0	7	0	−6	−12
	Jan. 5	−3	3	−7	−7	−7	−8	−31	2	−7
2	Nov. 24	−19	−9	−29	−21	−21	−19	−16	−17	−17
	Nov. 29	−6	−6	16	4	1	−11	−16	−11	1
	Dec. 5	69	54	33	51	49	32	17	42	35
	Dec. 8	−22	−26	−56	−33	−32	−40	−24	−18	−35
	Dec. 15	−1	−22	−29	6	8	1	−5	6	−9
	Jan. 5	−1	1	1	1	−5	0	1	1	1
3	Nov. 24	−9	17	35	14	16	25	34	24	24
	Nov. 29	7	6	10	−2	17	29	50	45	2
	Dec. 5	−33	2	3	−18	−15	−39	−20	2	−4
	Dec. 8	−4	43	4	−26	−7	−23	4	1	20
	Dec. 15	11	20	12	22	8	25	14	21	27
	Jan. 5	−4	−17	−9	−1	5	4	−9	−11	−10
4	Nov. 24	0	4	−5	5	−8	−14	−14	−3	−6
	Nov. 29	13	−16	−7	57	56	−27	10	8	−36
	Dec. 5	−8	33	47	19	6	−3	35	−21	10
	Dec. 8	−3	−4	11	−4	−12	20	19	32	9
	Dec. 15	−20	−26	−10	−22	−3	30	−10	41	−11
	Jan. 5	13	22	32	25	49	56	49	40	61
5	Nov. 24	−30	−24	−19	−29	−26	−24	−24	−30	−30
	Nov. 29	−30	65	11	13	63	63	23	17	1
	Dec. 5	−12	−8	25	23	9	−10	−21	−13	−16
	Dec. 8	2	16	6	8	8	6	12	29	87
	Dec. 15	−3	−9	6	13	5	4	7	−3	−3
	Jan. 5	−15	−23	19	−1	1	−6	5	28	43
6	Nov. 29	−48	−71	−57	−18	−16	21	−5	−15	15
	Dec. 5	25	−14	−19	−28	−40	−19	−33	−32	−29
	Dec. 11	−28	−22	−17	−21	−19	−17	−14	−26	—
	Dec. 19	−19	−60	−62	−75	−55	−54	−27	−51	−52
	Jan. 12	−3	−10	−11	−13	−22	1	−3	−7	−5
7	Nov. 29	−1	−42	−70	2	−1	1	−34	1	−46
	Dec. 5	28	14	18	12	13	28	17	14	20
	Dec. 11	14	−1	−20	0	49	15	49	4	−28
	Dec. 19	−12	−29	−25	−43	−4	−22	6	−26	−24
	Jan. 12	7	14	4	10	10	14	8	6	8

TABLE 2—*Continued*

SUBJECT	DATE	REACTION NUMBER								
		2	3	4	5	6	7	8	9	10
8	Nov. 29	27	19	62	56	25	31	24	45	15
	Dec. 4	4	−15	−1	4	−16	6	−3	−2	7
	Dec. 9	−15	29	19	0	17	40	22	39	46
	Dec. 12	−7	19	−2	−3	1	8	8	20	−21
	Dec. 19	−8	2	−24	11	−10	5	−27	6	5
	Jan. 12	6	30	−3	13	−10	15	−15	31	24
9	Nov. 29	−7	2	−27	−17	−43	−39	−52	−8	−20
	Dec. 4	6	7	−24	3	13	−1	16	5	19
	Dec. 9	0	18	14	−5	−9	−20	31	−10	1
	Dec. 14	−8	−6	−13	−17	−9	1	1	7	−8
	Jan. 12	−11	−16	−60	−21	−22	−13	2	−5	6
10	Nov. 29	−19	−31	−17	−8	7	−17	−17	−17	−7
	Dec. 4	39	19	20	32	76	11	20	11	−6
	Dec. 9	69	40	68	68	13	−3	18	69	20
	Dec. 16	17	12	13	20	13	22	46	9	17
	Jan. 12	18	18	23	82	72	38	28	17	37

college group who had taken part in Experimental Series No. I in the fall of 1930. For these subjects we used the same stimulus sequence for the two tests, assuming there would be no appreciable practice effect over such a long time interval. The results of the first test compared with those of the second test for each of these individuals are presented in table 4.

DISCUSSION OF RESULTS

The progress of results through the 3 experimental series indicated that in this type of experimental set up an inhibition could be conditioned and that variations appeared among our subjects whom we were able to condition under these circumstances. We found no instance where the response to the conditioned color was completely inhibited. The conditioned inhibition consisted only in delay of response. The amount of this delay varied for different subjects, but did now show wide variations for the same subject at different times. The character of these variations permitted a classification of our subjects into groups according to the amount of delay they experienced.

Inhibition to the conditioned color as evidenced by delayed response under these experimental conditions may be described as behavior manifesting constitutional type, because: first, it permits classification; secondly, it is presumptively inborn because it is not influenced by age, training, or previous experience with the same experimental set up; thirdly, it is related to a factor which affects the adaptive responses of the individual in many situations throughout a lifetime.

An analysis of the results shows that our zero, or the total lack of any

TABLE 3

SUBJECT	DATE	REACTION NUMBER								
		2	3	4	5	6	7	8	9	10
1	Nov., '31	−31	−40	−43	−41	−41	−45	−51	−57	−24
	Feb., '34	52	−2	−15	−2	4	2	17	−1	−12
2	Nov., '31	17	−19	−9	1	−18	−20	−10	−1	−17
	Feb., '34	40	0	−16	−42	−21	−23	−27	−19	−57
3	Nov., '31	15	13	24	5	−2	25	22	−17	−8
	Feb., '34	58	101	18	8	4	33	−6	2	−9
4	Nov., '31	10	24	7	9	14	14	17	29	32
	Feb., '34	20	1	29	−1	23	13	13	29	11
5	Nov., '31	−1	−6	−4	−3	5	−3	11	8	0
	Feb., '34	−2	13	4	−3	0	−6	−4	—	—
6	Nov., '31	−16	−22	7	7	−27	−6	−16	−7	−3
	Feb., '34	65	18	24	22	0	−22	−22	23	10
7	Nov., '31	40	−15	0	0	−35	−5	−45	10	6
	Feb., '34	0	−37	−13	−10	−3	−17	−18	−33	−31
8	Nov., '31	31	7	−23	−12	−2	2	−4	−9	−17
	Feb., '34	−20	−23	−15	−22	14	−6	12	14	−5
9	Nov., '31	−4	−6	−3	21	13	106	96	−14	−4
	Feb., '34	8	5	30	−2	5	−1	−8	−10	−16
10	Nov., '31	−11	9	−14	2	−71	3	−9	−81	−11
	Feb., '34	2	15	−20	4	−3	−6	9	1	−3
11	Nov., '31	−2	−14	−1	−54	−39	−54	31	−25	−5
	Feb., '34	−5	−38	−28	−40	−20	−38	−38	−27	—
12	Nov., '31	−20	−32	−12	−5	−12	5	−6	−6	−24
	Feb., '34	−8	−5	1	−23	−29	−12	−1	−1	—
13	Nov., '31	−2	3	−2	3	0	−2	−1	9	−8
	Feb., '34	7	−4	−12	−2	−5	−12	−4	−5	−2
14	Nov., '31	−20	−10	−5	−7	−10	13	3	−16	0
	Feb., '34	−16	−15	−20	−20	−13	−9	−14	−9	−1
15	Nov., '31	−1	3	8	−2	5	5	22	6	−2
	Feb., '34	9	3	−7	3	18	3	−3	−4	2
16	Nov., '31	−43	−39	−56	−35	−54	−54	−51	−59	−62
	Feb., '34	−20	7	−36	−30	−15	−30	2	—	—
17	Nov., '31	−34	−9	−21	−76	−69	4	−19	−42	−27
	Feb., '34	−32	12	−33	−44	−37	−28	−27	−42	3

conditioned inhibition, delineates a group of subjects which is average but not an extreme group as opposed to those who exhibit an unusually strong conditioned inhibition. These experimental conditions disclose another group for which the conditioned inhibition not only fails to establish itself, but which shows a definite acceleration tendency in the response to the conditioned color. Like the conditioned inhibition, this tendency is shown in various degrees in different subjects and remains consistent for any one subject over wide time intervals. When we are measuring the reaction time differences of these subjects we are not only dealing with a group whose tendency to condition inhibition cannot be measured by this technique, but we also find we actually are measuring something else manifested by this group. We assume that this acceleration tendency represents the practise effect or the positive conditioning to the color which would normally take place were there no inhibitory factor counterbalancing it. If this is true the variations within this group disclose variations in capacity for degree of acceleration with practise.

Presumably, each person during one

TABLE 4

SUBJECT	DATE	REACTION NUMBER								
		2	3	4	5	6	7	8	9	10
1	Fall, '30	−65	−5	−14	−29	−13	−19	−3	−27	−35
	May, '34	−36	−42	−64	−47	−43	−36	−37	−48	−48
2	Fall, '30	14	43	22	32	120	−50	−2	5	57
	May, '34	44	64	37	25	49	55	34	25	32
3	Fall, '30	2	21	27	21	13	17	26	12	15
	May, '34	9	9	8	−8	−8	0	−12	3	−8
4	Fall, '30	−9	−1	−1	20	8	25	11	−1	5
	May, '34	−24	−10	−34	−27	−16	−19	−20	−14	−47
5	Fall, '30	−20	0	0	−10	−3	−10	−2	20	−5
	May, '34	8	11	15	12	−7	4	12	1	5
6	Fall, '30	10	5	−2	18	1	7	−1	5	−2
	May, '34	−4	4	11	6	−1	2	16	26	15
7	Fall, '30	6	28	18	6	15	26	13	10	18
	May, '34	4	8	2	3	8	13	7	−3	−1
8	Fall, '30	19	33	64	44	18	34	21	50	19
	May, '34	−6	−30	17	3	16	9	−15	8	−18
9	Fall, '30	22	32	37	31	22	15	27	19	—
	May, '34	13	4	−24	−3	−5	−12	0	3	3

experimental sitting was continuously subjected to 2 factors influencing the length of the reaction time in opposite directions: one, the acceleration factor of practice; the other, the delaying factor of the conditioned inhibition. If this be so, any one point upon the graph showing the progress of the reaction time to the conditioned color represents the degree of balance between these two opposing factors at that moment and at that place in the series; and the entire series graphically portrays a history of the relative efficiency of these two factors in influencing the reaction time of the subject.

For 50 per cent of our subjects this history is one of a continuous, smooth counterbalancing of these 2 factors with a slight preponderance in favor of the delaying factor (see median for middle zone, figure 2). For 25 per cent of our subjects this history shows a marked swing early in the series in favor of the delaying factor with a gradual pull exerted by the accelerating factor, which brings the balance between the two down toward what we have called the middle zone, but not sufficiently into it at any time to approach the median for the middle zone (see median for upper zone, figure 2). Similarly for 25 per cent of our subjects the accelerating factor causes a sharp decrease in time at the beginning of this history (see median for lower group, figure 2) with a later pull by the delaying factor which lifts the graph toward the middle zone, but again does not bring it near to the median for the middle zone.

We may characterize the subjects whose histories fall within the middle zone as individuals whose behavior under these conditions is almost equally balanced by inhibiting and accelerating factors. We may characterize the 25 per cent in the upper zone as individuals who are predominantly under the influence of the inhibiting factor, and we may characterize the 25 per cent in the lower zone as those who are predominantly under the influence of the accelerating factor. Occasionally we find an individual whose reaction time history apparently represents, not a simultaneous counterbalancing of these 2 factors, with one or the other consistently favored, but a rapid swing between the two, with one or the other completely dominating behavior at any given moment. Figure 3 shows the graph of such an individual. These latter subjects probably do not represent a mixed type, but a fourth type, whose behavior reflects not a continuous counterbalancing of these two factors, but an intermittent domination.

If, within the very narrow confines of the simplified conditions of this experimental set up, we find the progress of the reaction time portraying and to some extent analyzing the effects of these two component factors which are modifying the subject's behavior, the possibility presents itself that the so-called learning curve, established under much more complex situations, also represents such a history of counterbalanced factors. In such a case the interpretation of the curve would not have significance if interpreted solely from the point of view of its own internal relationships, but could only be significant insofar as the position of the curve

at any one point could be related to the source of the component accelerating and delaying factors. In other words, in this experiment and in any experiment involving "learning," the objective results are probably always measuring two processes. In this instance the area above the zero line is

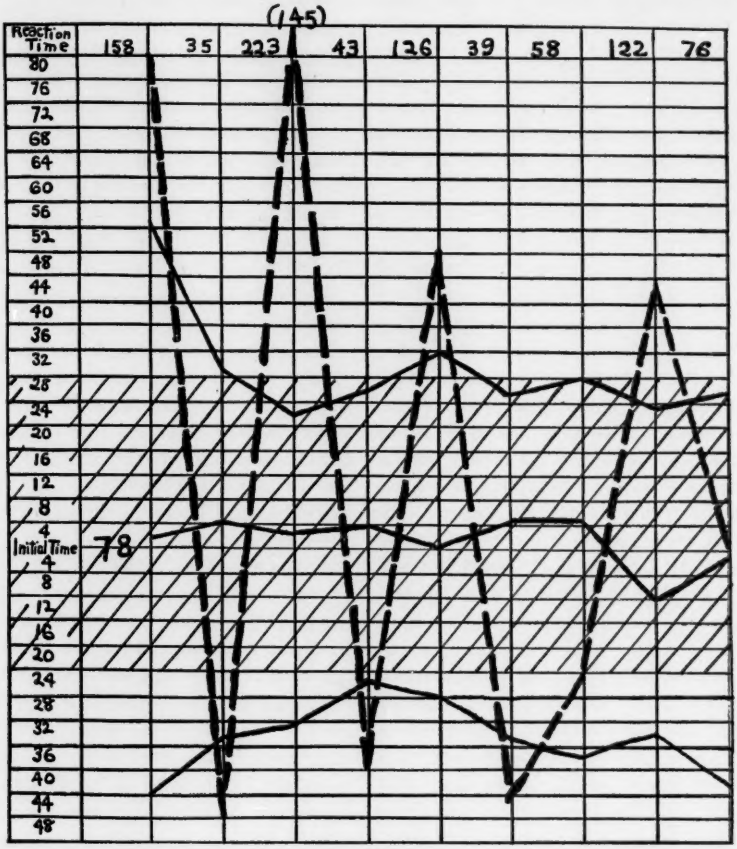

FIG. 3. RECORD FOR SUBJECT EXEMPLIFYING FOURTH TYPE SHOWING INTERMITTENT DOMINATION

Figures at vertical edge of record sheet represent time intervals in hundredths of a second. Horizontal spacing represents the sequence of presentation of conditioned color. The initial time for conditioned color for this subject was 78. Figures across top of the record sheet are the absolute reaction times for each subsequent presentation of conditioned color. Differences between initial time and subsequent times are represented by the broken line. Continuous lines represent medians determined for upper, middle and lower zones with which the record for this subject can be compared.

measuring a delaying process; the area below the zero line is measuring an accelerating process. For any measurement to be valid where such counterbalanced forces are at work producing objective results, a zero of some sort must be established, and the counterbalanced forces analyzed with regard to their relation to each other at any given moment.

The general behavior of an individual cannot be accepted as indicative of his placement in a classification of constitutional type involving rapidity of conditioning to inhibitions. Any child or adult may become through experience so strongly conditioned with inhibition of response or with a positive response to any sort of stimulus that his behavior in the face of such a stimulus is of no significance for his constitutional type placement. By the time a child is a few years old, his environment will be so filled with these stimuli that no ordinary set of circumstances can be depended upon as a guide to the nature of his constitutional type. This will be especially true if the circumstances of his life have favored the injection of frequent and strong emotional responses into his totality of adaptive behavior. The trend of these conditioned responses, formed through daily experience, may be such as to even simulate the extreme of one constitutional type when the child may actually be of the extremely opposite type. Social situations particularly will fail as indicators of constitutional type, and laboratory test situations which involve a large proportion of social contacts might give results in which the nature of the constitutional type would be obscured by conditioned responses to stimuli inherent in the social contact itself.

The reliability of the test for constitutional type, then, will be in direct proportion to the degree in which it is withdrawn from situations to which the individual is accustomed to adapt, to the degree of paucity of stimuli originating in social contacts, and to the amount of novelty in the total situation. Only in the novel situation is the child freed from obscuring cues to well-established conditioned behavior and constitutional type demonstrated with clarity.

In making clinical application of the results of this test, we find clearly apparent this discrepancy between objective test results and the inference drawn from the general character of the behavior of the child. We do, however, find a close correspondence between the objective results of the test and the rapidity of the response of the child to remedial programs. Those children who could be classified in the middle or lower zone on the basis of their behavior during the reaction time experiment responded rapidly to programs undertaken to help them in the overcoming of emotional and personality maladjustments. The children who were classified as belonging in the upper zone, when they were given this test, made slow response to remedial programs. The following instances will illustrate this point:

"A" was referred to the Laboratory because through one entire term and part of another in kindergarten she had never been known to speak, either on the playground or in the school room, although she chattered freely,

intelligently and intelligibly in the home. The case history showed the gradual development of a sibling problem. "A" was one of the younger members of a large family of children; the oldest child was a girl; "A" was a girl; all the rest were boys. At the time of "A's" birth, the older sister announced that she had prayed for a little sister, her prayer had been answered, and the rest of the family could make up their minds to have nothing to do with the baby. From that time forth she took entire charge of the baby, caring for her, keeping her in her own room, and completely mothering and dominating her. When "A" started to kindergarten and it was found that she was too shy to speak, the older sister made frequent visits to the school room to inquire of the teacher if "A" had spoken yet. A remedial program involving devices to condition "A" more favorably to the school situation and also a readjustment of the emotional situation in the family field through the coöperation of the mother and older sister were undertaken. Although this program was eventually successful, "A's" response was very slow. It was six months before "A" became sufficiently well adjusted to talk and recite freely in the school situation. A year after this adjustment had been arrived at, "A" was one of the schoolroom subjects who took part in Experimental Series No. II. The objective results lay in the upper zone, indicating that she was persistently dominated by the delaying factor. Her individual graph is shown in figure 4 (Subject "A").

"B" was referred to the Laboratory by her mother and the school teacher, because of disciplinary trouble in school. "B" was very fidgety, and showed much hyper-activity. Her attention could not be held on any one thing for very long. The teacher felt that she was competent, but too flighty to be able to adjust well to the school routine. During the entire period of the examination in the Laboratory, her whole behavior was that of the hyper-active, excitable sort of child. We were surprised to find that the reaction time results gave a placement in the upper zone. Her problem was emotional, involving a certain amount of neglect by a young, well-to-do and socially inclined mother. The mother was intelligently coöperative and "B" reached a wholesome adjustment, but this was only after a number of months. After this adjustment was reached, however, all the hyper-activity and signs of over-excitability disappeared entirely, and "B" developed a stable type of adaptive response in social situations. For her reaction time record see figure 4, Subject "B".

"C" was brought into the Laboratory by her mother because of her very timid and reserved behavior with other children and with adults. Her mother described her as painfully shy, unable to make recitations in school, over-fond of reading, spending most of her play-time in lonely activity and in every way a withdrawn and shut-in personality. We were prepared to guess from the general picture which the mother drew and from the behavior of the child during general laboratory examination, that a reaction time test would show her zone place-

ment to be that of the upper group. We were surprised to find, when we actually made the test, that it fell squarely in the middle zone. "C" was the child of missionaries to China. Her family had been involved in war and rebellion in that country and there had been harrowing experiences with escape from the fighting zones. The parents had followed the policy of avoiding all discussion of these experiences with the child and at-

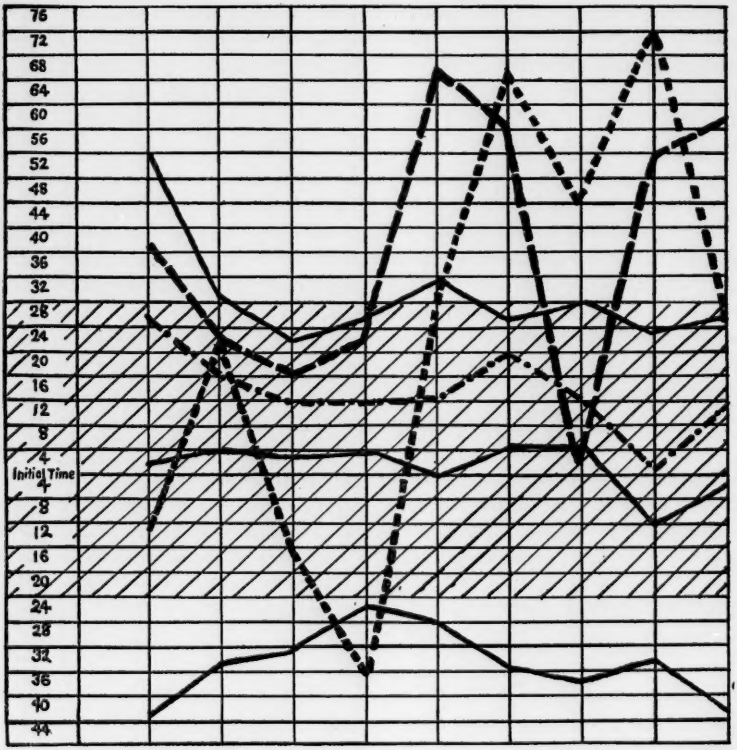

FIG. 4. RECORDS OF SUBJECTS BROUGHT INTO THE WICHITA CHILD RESEARCH LABORATORY FOR CLINICAL EXAMINATIONS BECAUSE OF BEHAVIOR PROBLEMS

Short interval broken line represents performance of Subject A (see text). Long interval broken line represents performance of Subject B (see text). Dash dot line represents performance of Subject C (see text). Continuous lines represent medians established for upper, middle and lower zones with which the three individual records for the three subjects can be compared.

Figures at the vertical edge of the record sheet represent time intervals in hundredths of a second. Horizontal spacing represents the sequence of presentation of conditioned color.

Graphs are plotted in terms of differences between initial reaction time to conditioned color and subsequent reaction times to conditioned color.

tempting to have her forget it all as quickly as possible. The behavior difficulties had developed upon her return to the United States and her attempt to participate in school routine here. A program of emotional readjustment to her own experience in China was undertaken with "C", and the parents guided in a more wholesome attitude toward the child's problem as it related to these experiences. "C" made a very rapid adjustment. Subject "C", figure 4, shows the objective results of the test with "C".

These few illustrations serve to show the impossibility of predicting the child's zone placement from any observation of general behavior in the ordinary social situation, but indicate the possibility of the use of the objective test as an aid in judging the chances of rapid or slow response to remedial programs.

SUMMARY

1. It is possible, under the experimental set up described, to produce in some individuals a quantitatively measurable conditioned inhibition.

2. This conditioning occurs early in the test if at all.

3. The objective results obtained under this experimental set up are indicative of a tendency in most of the subjects to be dominated by either delaying or accelerating factors or to be equally influenced by these two factors throughout the test period. These may be termed hyper-inhibitive (delayed type), hypo-inhibitive (accelerated type), or balanced.

4. There is a possibility that a fourth kind of subject may represent a true type: the individual who is intermittently subject to domination by the two extreme factors. This may be termed an intermittently-inhibitive type.

5. Statistical treatment of the objective results of this test indicate that they are not influenced by age or training.

6. The absolute reaction time is not indicative of type.

7. The objective results remain consistent in character for a given individual throughout different tests performed after both long and short time intervals.

8. The objective results seem to represent the status at a given moment of the relation between counterbalancing factors, a factor which is delaying response and a factor which is accelerating it.

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Physical Measurements of Mexican Children in American Schools

H. T. Manuel

IT IS the purpose of this paper to report certain physical measurements of Mexican children in American schools. The problem arises in the practical situation in which one wishes to interpret measurements of Mexican children by reference to commonly used tables like the Baldwin-Wood height-age-weight tables. *A priori* one questions whether these tables are well adapted to use with children of a racial group and a geographical location different from that on which they were based.

There are two main elements in the racial derivation of Mexican children —white (largely Spanish) and Indian. But this mixture is by no means homogeneous throughout the population. On the contrary, individuals vary all the way from pure white to pure Indian. It would be of considerable anthropological interest to record measurements by races. Separation into races, however, would be an enormously difficult if not impossible task. Moreover, the differences within a race are usually greater than the differences between races. Furthermore, it was our purpose to contribute to the solution of the practical problem of dealing with a population defined on other than racial grounds. We desired to make no distinctions within the group except those which could easily be made. Skin color, which incidentally seemed to be the most useful of the anthropological measurements used by Paschal and Sullivan (4) as an index of Indian blood, was used as the only basis for anything approaching a racial classification.

PROCEDURE

Our measurements were made in the elementary schools of El Paso and Laredo, Texas, in the spring of 1930. In each city a staff of workers was recruited and instructed in making the measures desired.[1] In general, each worker specialized on one or two measures, but there was a little overlapping of work, and a few measures were made by the writer.

[1] The writer is indebted to Superintendent A. H. Hughey and Assistant Superintendent W. A. Stigler, of El Paso, and to Superintendent W. P. Galligan and Supervisors W. J. Lemoine, Mrs. Asher R. Smith, and M. B. Brown, Jr., of Laredo, as well as to numerous teachers, principals, and pupils, for coöperation in this program. The personnel of the main measuring groups was as follows: Mary Frances Hogan, Mrs. Margaret L. Feuille, Maryelton Benton, and Mrs. Gladys Carlock, of El Paso; Mrs. H. W. Johnston, Mrs. J. T. Hall, W. E. Haynes, Mrs. W. E. Haynes, and Mrs. W. J. Lemoine, of Laredo. Grateful acknowledgment is made of the financial assistance of the Fund for Research in the Social Sciences, of the University of Texas, in making these measures and preparing this report.

The particular measures used in this study were selected because of their theoretical bearing upon growth and nutrition, their relation to the work of other investigators, particularly Baldwin and Franzen, and the relative ease with which they could be made. The choice of measures was further restricted to those which could be made in mixed groups without the removal of clothing other than coats, sweaters, and shoes. Height, width of hips, width of shoulders, and chest depth were included as measures of skeletal size; weight and arm girth as possible indices of nutritional status and physical condition. At first, the girth of the chest was taken, but this measurement was abandoned in favor of chest depth because of the difficulty of getting a reliable measure within a short time. In the case of a few children the length and breadth of the skull was measured.

Additional data included skin color, age, grade, sex, and occupation of parent, and in some cases the part of Mexico from which the children or their parents had come.

Height was measured in inches. Record was made of the last quarter-inch passed. Shoes were removed for this measure. In the beginning the stadiometer connected with the weighing scales was used, but after a little while a rigid scale attached to a vertical screen or to a wall was substituted. A try-square was placed on the head of the child to indicate his height on the scale.

Width of hips and width of shoulders were recorded in centimeters and tenths. For these measures large wooden sliding calipers were used. The shoulder measurement was made to include the distance from humerus to humerus on the outside of the arm just below the acromion process. In the hip measures the major trochanters were located by palpation and the calipers adjusted to measure this distance. The hip measures and in many cases the shoulder measures were made over the clothing. After a number of actual measurements of clothing had been made, a scale for allowing for the thickness of the clothing was devised, and the allowances in individual cases were noted on the record form at the time of measurement.

Chest depth was measured by the Stoelting spreading calipers employed in skull measurements. Record was made in centimeters and tenths. One end of the calipers was placed over the sternum just below the depression between the ends of the two clavicles, and the other end was placed over the spiny process of the vertebra at about the same level. For a second measure the anterior end was moved slightly to one side and another reading was made. If the second measure differed much from the first, attention was directed toward remeasurement. The measurement in both positions was recorded.

Weight was measured by the ordinary beam scales used by physicians. Record was made of the last quarter pound passed on the beam.

Our work with arm girth soon showed the need for a convenient instrument to equalize tension on successive measurements. This was accomplished by an instrument devised especially for these measure-

ments. It consisted essentially of two coiled steel tapes so mounted on a brass strip that the free ends could be attached to each other after one tape had been looped around the arm to be measured. When the tapes were thus arranged, the operator released the springs, and the tapes then pulled in opposite directions, thus controlling the tension automatically (3). Two measures were taken, one with the arm at right angles with the body and the forearm flexed back so that the fingers touched the shoulders and the other with the arm hanging loosely at the side.

Cranial measures were taken with the Stoelting spreading calipers.

Skin color was graded as light, medium, or dark on a scale made for the study. This scale was made by picking out three children who seemed to be typical of three stages of pigmentation and matching their colors as nearly as possible by means of painting water-color strips on paper. Miss Gladys Rupkey, art teacher, kindly made these color strips.

Only a part of the results obtained will be reported in this paper.

Reliability of measures

One who has worked critically in the measurement of school children knows that there are many sources of unreliability—carelessness, imperfect instruments, errors in reading a scale, errors in recording the measurement, differences in technique, variations in the coöperation of the children, and the like. From a practical point of view, errors may be minimized by care in following directions and by repeating individual measurements when anything of importance is at stake. In scientific studies variable errors tend to cancel each other when central tendencies are being computed, but they tend to diminish coefficients of correlation. Cases that show extreme errors, however, if the errors are apparent from inspection, may be excluded when computations are made.

In assembling the data for this paper particular attention was given to reliability. Instruments were carefully selected and efforts were made to keep them in good order. Two measuring staffs were used, and each individual was instructed in the work to which he was assigned. At intervals the author watched the procedure and sometimes even measured alongside a given worker. To stimulate care and to secure data for coefficients of reliability, some of the groups were measured twice within a few minutes by the same individuals.

Number of cases. The measurements reported in the following pages are based upon about 3600 cases, distributed by sex, age, city, and skin color as in table 1. With negligible exceptions the numbers within the several ages are the same for all the tables. It will be observed that the sampling is best for ages 8 to 13, inclusive, and clearly inadequate for ages below 6 and above 15.

Skin color. The classification of pupils by our rough color scale (light, medium, and dark) seems satisfactory for our purpose. Of 107 cases judged twice by the same persons, 86 were put in the same classification each time, and none were changed more than one step. In the cases in which the author also recorded a judgment, the agree-

TABLE 1

Number of children

AGE	LAREDO				EL PASO				BOTH CITIES			
	L	M	D	Total	L	M	D	Total	L	M	D	Total
A. Boys												
5					3	5	3	11	3	5	3	11
6					23	35	48	106	23	35	48	106
7	3	4	7	14	27	51	57	135	30	55	64	149
8	4	19	14	37	44	70	66	180	48	89	80	217
9	2	16	21	39	38	76	65	179	40	92	86	218
10	5	23	24	52	43	92	86	221	48	115	110	273
11	9	28	21	58	33	71	75	179	42	99	96	237
12	11	16	26	53	21	69	62	152	32	85	88	205
13	10	16	21	47	31	57	59	147	41	73	80	194
14	16	25	23	64	12	32	37	81	28	57	60	145
15	4	18	11	33	5	15	21	41	9	33	32	74
16	1	6	7	14	1	5	5	11	2	11	12	25
17	2	1	2	5		1	3	4	2	2	5	9
Total boys.	67	172	177	416	281	579	587	1,447	348	751	764	1,863
Per cent boys.....	16.1	41.3	42.5	100	19.4	40.0	40.6	100	18.7	40.3	41.0	100
B. Girls												
5					5	5	1	11	5	5	1	11
6					31	39	38	108	31	39	38	108
7	8	4	5	17	32	49	45	126	40	53	50	143
8	10	18	13	41	30	59	54	143	40	77	67	184
9	19	19	15	53	39	72	76	187	58	91	91	240
10	18	24	21	63	44	64	70	178	62	88	91	241
11	20	19	17	56	35	44	71	150	55	63	88	206
12	17	32	20	69	33	48	73	154	50	80	93	223
13	26	24	19	69	21	41	46	108	47	65	65	177
14	16	18	21	55	24	33	24	81	40	51	45	136
15	8	22	21	51	11	13	23	47	19	35	44	98
16	8	7	5	20	4	6	9	19	12	13	14	39
17	1	4	2	7		2		2	1	6	2	9
Total girls.	151	191	159	501	309	475	530	1,314	460	666	689	1,815
Per cent girls.....	30.1	38.1	31.7	100	23.5	36.1	40.3	100	25.3	36.7	38.0	100
Total boys and girls..	218	363	336	917	590	1,054	1,117	2,761	808	1,417	1,453	3,678
Per cent boys and girls.....	23.8	39.7	36.6	100	21.3	38.2	40.5	100	22.0	38.5	39.5	100

ment in general was high. Moreover, the percentages found by the Laredo staff to be light, medium, and dark, respectively (23.8, 39.7, 36.6), are very near the corresponding percentages (21.3, 38.2, 40.5) found by the El Paso staff. The tendency, however, to assign girls a lighter skin color than boys probably reflects, in part at least, a difficulty of the method.

From table 1 it may be seen that light, medium, and dark colors were assigned to boys (using approximate percentages) in the ratio of 19–40–41, to girls in the ratio of 25–37–38, and to both together in the ratio of 22–39–40. Thus it appears that at least a fifth and possibly a fourth of the group have light skin colors according to our three-division scale, and that about two-fifths have the dark skin color probably associated with the greatest percentage of Indian blood.

Height and weight. The measures most commonly used by the layman and at least until recently by the teacher in estimating physical status are height and weight. Tables of height and weight according to age have received wide currency, and, despite the doubt placed upon their value in estimating physical condition by the work of Franzen (2), are still widely used. It will be serviceable, therefore, to report height and weight together and to use in part tables corresponding more or less to those in common use.

It will be recalled that our children were weighed with clothing except hats, coats, shoes, and heavy sweaters and that the measures were made in the spring. To determine the allowance which should be made for clothing, some of the children were weighed with and without clothing or the clothing they wore was removed and weighed. The weight of the girls' clothing varied from ¼ to 1¼ pounds and averaged just a little more than ½ pound. The boys' clothing was a little heavier, ranging from ½ to 3 pounds. The average in one group was between 1¼ and 1½ pounds. In general, of course, the older and heavier children had the greater weight of clothing.

TABLE 2

Mean height and weight of Mexican children. Obtained values

Height is in inches, weight in pounds.

Allow about ¼ pound for clothing for younger girls, ¾ pound for older girls, 1 pound for younger boys, and 1¾ pounds for older boys.

AGE GROUPS	HEIGHT		WEIGHT	
	Boys	Girls	Boys	Girls
6.0– 6.9	44.9	44.6	45.3	43.0
7.0– 7.9	46.7	46.6	48.9	47.7
8.0– 8.9	48.6	48.5	53.9	51.7
9.0 –9.9	50.8	50.6	60.0	58.0
10.0–10.9	52.6	52.6	64.9	63.4
11.0–11.9	54.5	55.0	71.7	71.9
12.0–12.9	56.5	57.4	79.2	83.7
13.0–13.9	59.4	59.4	90.4	89.2
14.0–14.9	61.4	60.1	100.3	98.6
15.0–15.9	62.9	60.5	108.2	101.3

The mean height and weight of our children in age groups six to fifteen (last birthday) are shown in table 2.

By a process of interpolation and extrapolation the heights and weights of our children at their *nearest* birthdays were estimated and are shown in table 3. This table shows also similar averages for "American-born" chil-

dren, from the Baldwin-Wood tables printing of September, 1931 (1) and for children in Mexico, from the Publicaciones de la Secretaría de Educación Pública of Mexico (5). The Baldwin-Wood tables employ the median for height and the mean for weight. The Mexican tables report the "media" in centimeters and kilograms, but we have reduced these units to inches and pounds for our table. Curves based upon table 3 are presented in figures 1 and 2.

TABLE 3

Mean Height and Weight of Mexican children compared with Baldwin-Wood averages

AGE, NEAREST BIRTHDAY	HEIGHT			WEIGHT		
	Mexican		Baldwin-Wood‡	Mexican		Baldwin-Wood‡
	U. S.*	Mexico†		U. S.*	Mexico†	
	A. Boys					
6	43.8	43.7	46.0	43.4	41.9	48.3
7	45.8	45.5	48.0	47.1	46.3	53.1
8	47.7	47.8	50.1	51.4	50.7	58.2
9	49.7	49.8	52.2	56.9	56.2	63.9
10	51.7	51.8	53.9	62.4	61.7	70.1
11	53.6	53.5	55.7	68.3	68.3	76.5
12	55.5	55.3	57.5	75.4	73.9	82.9
13	57.9	57.9	59.6	84.8	83.8	91.7
14	60.4	60.6	62.2	95.4	94.8	104.9
15	62.2	63.2	64.7	104.2§	106.9	117.3
	B. Girls					
6	43.6	43.9	45.2	40.9	41.9	46.0
7	45.6	45.9	47.3	45.3	46.3	50.9
8	47.6	48.2	49.5	49.7	52.9	56.8
9	49.6	49.6	51.5	54.8	56.2	63.0
10	51.6	52.0	53.4	60.7	62.8	69.0
11	53.8	53.7	55.6	67.6	69.4	76.4
12	56.2	56.1	58.0	77.8	79.4	85.6
13	58.4	58.7	60.6	86.5§	98.1	99.6
14	59.8	59.5	62.2	93.9§	105.8	108.9
15	60.3	60.2	63.0	100.0§	110.2	115.5

* Our group. Heights and weights are derived from data in table 2 to give approximate values for ages at nearest birthday.

† Measures reported by Department of Psychopedagogy and Hygiene of the Secretariat of Education to Sixth Pan American Congress, June, 1930.

‡ Baldwin-Wood Tables for "American-born" boys and girls (clothed).

§ Average weight of boys at 15 and of girls at 13, 14, and 15 are of doubtful value (see text).

The heights of our children are remarkably close to those reported for children in Mexico. The weights also differ little except in the case of girls of ages 13, 14, and 15, for which

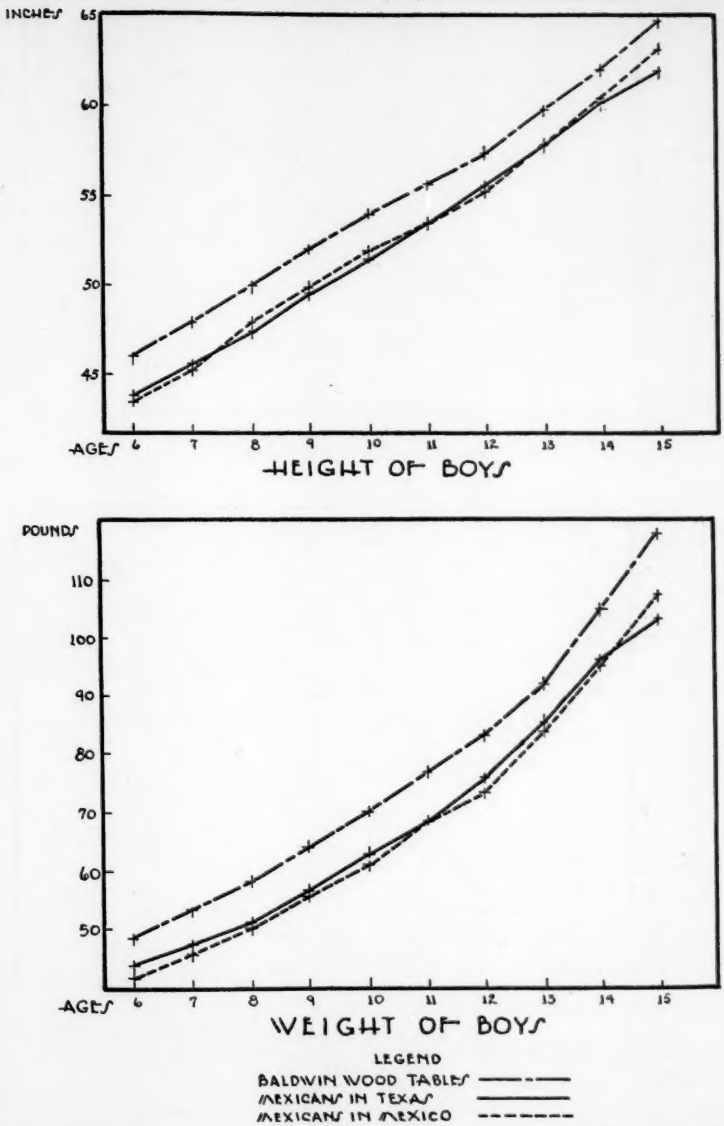

FIG. 1. HEIGHT AND WEIGHT OF BOYS, AGES SIX TO FIFTEEN, NEAREST BIRTHDAY

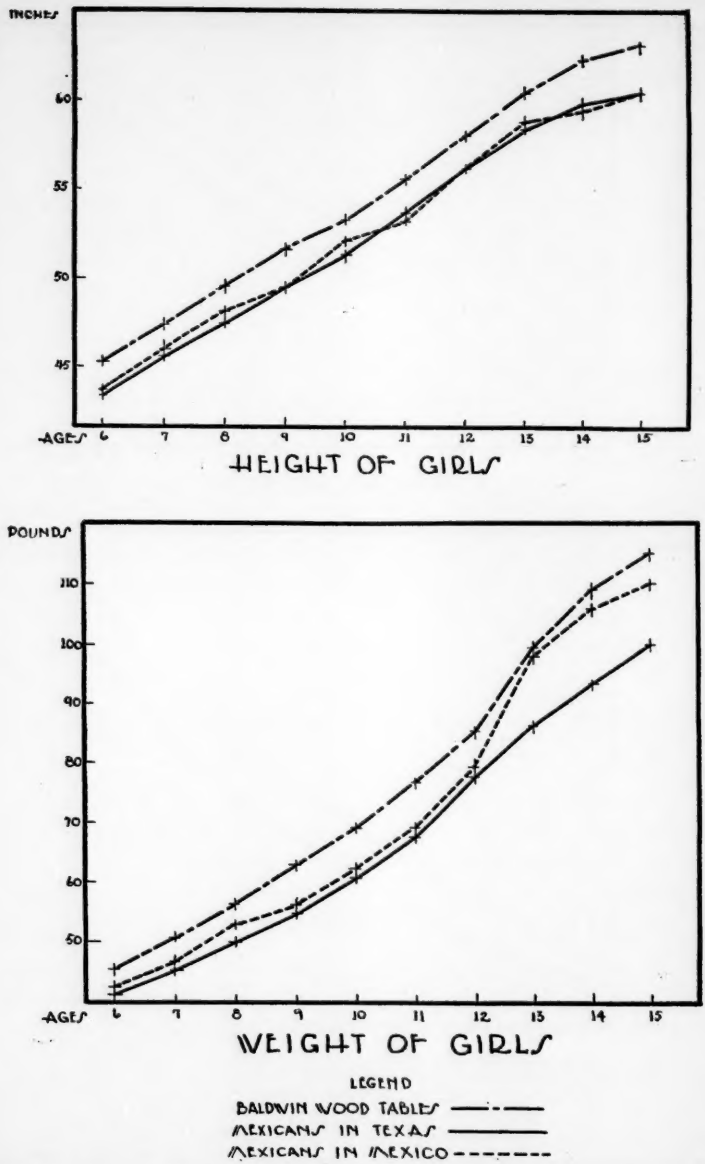

FIG. 2. HEIGHT AND WEIGHT OF GIRLS, AGES SIX TO FIFTEEN, NEAREST BIRTHDAY

ages apparently a selective factor tended to exclude the heavier girls from enrollment in the grades measured by us. The El Paso girls of ages nine to fifteen were on the average about 3.5 pounds heavier than the Laredo girls. In general our boys are slightly heavier than the boys in the group reported from Mexico and our girls a little lighter.

In comparison with the Baldwin-Wood averages our children are clearly a shorter and lighter group. The average difference in height of the groups of boys six to fourteen, inclusive, is 2.1 inches; for the groups of girls six to twelve inclusive, 1.8 inches. These differences are fairly uniform throughout the range of ages. Similar average differences in weight are 7.2 and 7.3 pounds, respectively, ranging from about five to nine pounds as age increases. When differences in the allowances for clothing are taken into account, the differences in weight will be reduced from $\frac{3}{4}$ to 2 pounds for boys and about $\frac{3}{4}$ of a pound for girls. Probably it is safe to say that our Mexican children are about two inches shorter, age for age, and about four to seven pounds lighter than the children reported in the Baldwin-Wood tables.

Weight—height—age tables similar to the Baldwin-Wood tables are presented as table 4. Naturally these tables represent a great deal of approximation. The table for girls is probably not fairly representative of the total population above age 12 because of the selective factor already mentioned. The table for boys at age 15 is in doubt for similar reasons.

Other measures. The means of three additional measures of skeletal size (width of shoulders, width of hips, and depth of chest) and the mean girth of the upper arm are shown in table 5.

Variability. An illustration of the variability of the measures is given in table 6, which shows the distribution of the measures of ten-year-old children.

Sex differences. Curves of growth, plotted from the means of tables 2 and 5, are shown in figure 3.

In general, the boys have slightly larger measures than the girls between the ages of six and ten or eleven except in the case of the width of hips, in which the girls take the lead at age seven. The earlier maturity of girls is shown in the crossing of the curves for all measures except width of hips at eleven or twelve. The curves recross at thirteen or fourteen. Again it is suggested that probably a number of the heavier girls have been omitted from our group.

A comparison with the Baldwin-Wood tables for height and weight suggests a possible earlier maturity for the Mexican children than for the children on whom the Baldwin-Wood tables were based.

Comparison by skin color. It was thought that a racial factor roughly correlated with skin color might appear in the measurements. Consequently, measures of light, medium, and dark children were tabulated separately. On account of the limitations of space only a summary based on ages seven to fourteen, inclusive, is given here. Differences were found between the mean measures of the light and dark, light and medium, and medium and

TABLE 4

*Weight—Height—Age Table—Mexican Children in Elementary Schools of Texas**

HEIGHT IN INCHES	AGES (NEAREST BIRTHDAY)										HEIGHT
	6	7	8	9	10	11	12	13†	14	15†‡	
A. Boys											
42	39										42
43	41	41									43
44	43	43	44								44
45	45	45	46								45
46	47	47	48	48							46
47	49	49	50	50	51						47
48	51	51	52	52	53						48
49	53	53	54	54	55	56					49
50		56	57	57	57	58					50
51		59	60	60	60	60	61				51
52			63	63	63	63	63				52
53			65	66	66	66	66	66			53
54				68	69	69	69	69			54
55				71	72	72	73	73	73		55
56					76	76	77	77	77		56
57					80	80	81	81	81	81	57
58						84	85	85	85	85	58
59						88	89	89	89	89	59
60							93	93	93	93	60
61							98	98	98	98	61
62								102	102	102	62
63								106	106	106	63
64									110	110	64
65									115	115	65
66										121	66
B. Girls											
41	36										41
42	38	38									42
43	40	40									43
44	42	42	42								44
45	44	44	44	44							45
46	46	46	46	46							46
47	48	48	48	48	48						47
48	50	50	50	50	50						48

* Age, nearest birthday; height, nearest inch; weight, nearest pound. Measured with clothing except shoes, coats, hats, and sweaters. Allow about ½ pound for clothing for younger girls, ¾ pound for older girls, 1 pound for younger boys, and 1¾ pounds for older boys.

† Weights for girls of ages 13, 14, and 15 are probably too low for the Mexican population in general.

‡ Weights for boys of age 15 may be too low for the Mexican population in general.

TABLE 4—*Concluded*

HEIGHT IN INCHES	AGES (NEAREST BIRTHDAY)										HEIGHT
	6	7	8	9	10	11	12	13†	14	15†‡	
B. Girls—*Concluded*											
49		52	52	53	53	53					49
50		55	55	56	56	56					50
51			58	59	59	59	59				51
52				61	61	61	61				52
53				63	64	64	64	65			53
54				67	68	68	68	69	70		54
55					71	71	72	72	74	75	55
56					74	74	76	76	78	80	56
57						79	80	81	83	85	57
58						84	84	86	87	90	58
59							88	89	91	95	59
60							92	93	95	99	60
61								96	98	103	61
62								100	103	107	62
63									107	111	63
64									111	115	64
65										120	65

TABLE 5

Additional Measurements of Mexican children

(Means in centimeters)*

AGE (LAST BIRTHDAY)	WIDTH OF SHOULDERS		WIDTH OF HIPS		CHEST DEPTH		ARM GIRTH	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
6	25.4	24.8	20.1	20.0	9.1	9.0	16.7	16.4
7	26.6	26.2	20.8	21.1	9.5	9.5	16.9	17.0
8	27.4	27.1	21.6	21.8	9.8	9.7	17.5	17.4
9	28.6	28.1	22.7	22.8	10.2	10.0	18.3	18.2
10	29.7	29.3	23.6	23.8	10.5	10.3	19.0	18.8
11	30.6	30.5	24.6	25.2	10.8	10.7	19.7	19.7
12	31.5	31.9	25.7	27.2	11.1	11.3	20.5	20.9
13†	32.9	32.9	27.1	28.5	11.6	11.6	21.9	21.3
14†	34.5	33.9	28.5	29.8	12.1	12.0	23.0	22.5
15†	35.9	34.2	29.5	30.3	12.5	12.1	24.2	23.0

* To reduce to inches multiply by .39.

† Probably selection has made the means for girls of ages 13, 14, and 15 unreliable for the population as a whole—possibly also the means for boys of 15.

dark, respectively, at each of these eight year levels. Obviously, this makes 8 differences for each comparison of light and dark, light and medium, and medium and dark. The number of times the mean of the light was greater than that of the dark, the mean of the light greater than that of the medium, and the mean of the medium greater than that of the dark

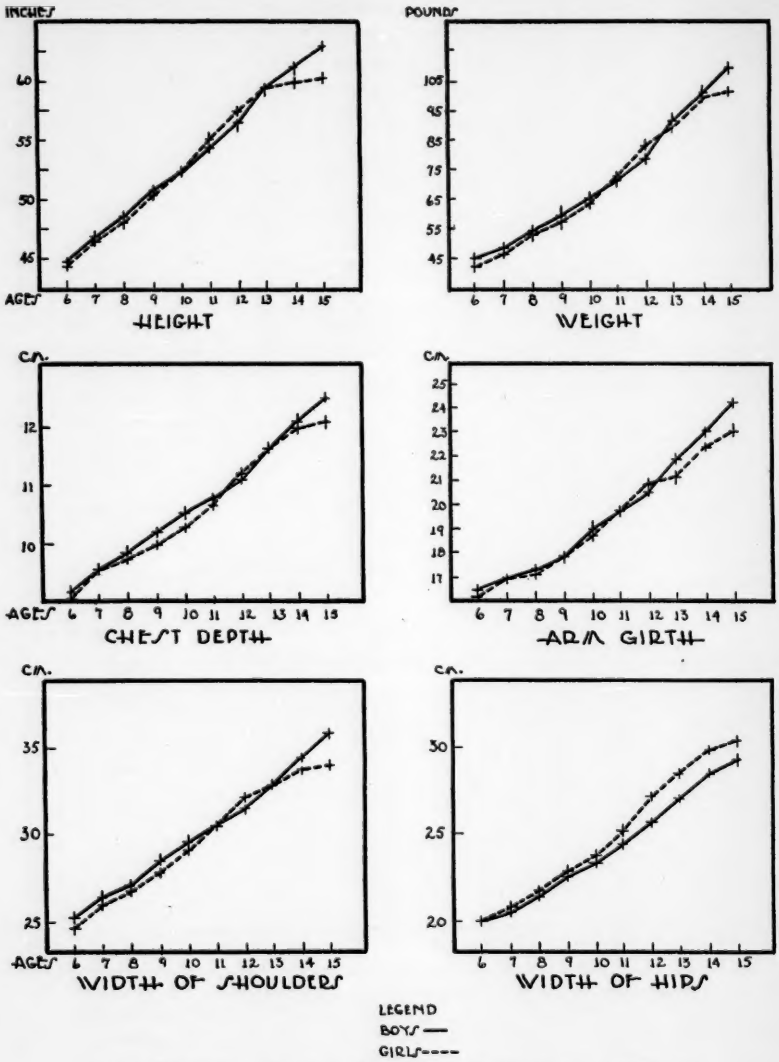

FIG. 3. CURVES OF GROWTH, AGES SIX TO FIFTEEN, LAST BIRTHDAY

TABLE 6

Distribution of Measures of Ten-Year-Old Children

HEIGHT			WEIGHT			WIDTH OF SHOULDERS			WIDTH OF HIPS			DEPTH OF CHEST			ARM GIRTH		
In.*	Boys	Girls	Lbs.	Boys	Girls	Cm.	Boys	Girls	Cm.	Boys	Girls	Cm.	Boys	Girls	Cm.	Boys	Girls
59	1	1	106–109	1		35	1	1	29	1		13	1		26	1	
58	2	1	98–101	2		34	2		28	1	3	12.5			25		
57	7	6	90–93		3	33	2	3	27	1	7	12	2		24		1
56	7	13	82–85	5	7	32	20	10	26	2	17	11.5	13	6	23	5	5
55	23	17	78–81	13	10	31	29	20	25	26	21	11	35	32	22	2	5
54	28	28	74–77	18	12	30	56	45	24	61	49	10.5	75	58	21	19	15
53	49	31	70–73	28	20	29	72	57	23	94	61	10	91	68	20	19	25
52	48	38	66–69	42	29	28	29	57	22	53	57	9.5	37	48	19	77	46
51	35	46	62–65	45	44	27	26	32	21	33	20	9	17	25	18	82	63
50	36	28	58–61	62	43	26	13	9	20	1	4	8.5	2	4	17	53	49
49	20	18	54–57	36	32	25	1	5	19		1	8		1	16	14	28
48	9	6	50–53	15	24	24	1	1							15		3
47	4	2	46–49	5	15										14	1	
46	2	2	42–45	1													
45		1															
44	1	1															
Total.....	272	239		273	239		272	240		273	240		273	242		273	240
Mean.....	52.6	52.6		64.8	63.4		29.7	29.3		23.5	23.8		10.5	10.3		19.0	18.8
S.D.....	2.4	2.4		8.9	9.4		1.7	1.7		1.3	1.6		.7	.7		1.5	1.7
S.D. of mean.....	.14	.16		.54	.61		.10	.11		.08	.10		.04	.04		.09	.11

* In., inches; lbs., pounds; cm., centimeters; S.D., standard deviation.

is shown in table 7. The table shows also the average differences between the means.

Reference to table 7 reveals small differences between the measurements of children of different color. The average difference (average of differences of means at different age levels) is in every case less than an inch, less than a pound, or less than a centimeter. Practically, therefore, the difference is negligible.

From a theoretical standpoint it may be important to note a trend, not always consistent, for the lighter boys to have slightly higher measurements than the medium, and the medium to have slightly higher measurements than the dark. In the case of the girls, the children of medium color have higher means than those of dark color in all of the measures, but the position of those of light color with reference to both those of medium and those of dark color is variable, being sometimes above and sometimes below. On the whole, it appears that both boys and girls of dark color tend to be a little smaller than those of lighter color, except possibly in depth of chest. With these small differences our estimate of reliability may be based upon trends rather than upon the usual statistical test of the adequacy of sampling. A suggestion of the difference in means required for statistical reliability may be had from a study of table 6, which shows a

TABLE 7

Differences in measurements according to skin color

	HEIGHT	WEIGHT	WIDTH OF SHOULDERS	WIDTH OF HIPS	DEPTH OF CHEST	ARM GIRTH
1. Number of times in eight comparisons differences indicated are positive						
Light minus dark:						
Boys	7	5	5	5	2	6
Girls	8	5	5	3	2	4
Light minus medium:						
Boys	4	5	3	4	3	5
Girls	6	4	3	4	1	3
Medium minus dark:						
Boys	6	4	6	4	3	6
Girls	6	5	3	4	4	5
2. Average difference between means for the years 7–14						
Light minus dark:						
Boys	.59	.80	.25	.12	−.03	.24
Girls	.43	.28	−.03	.07	−.05	−.04
Light minus medium:						
Boys	.10	.71	−.01	.02	−.02	.16
Girls	.24	−.56	−.06	.03	−.09	−.13
Medium minus dark:						
Boys	.49	.10	.26	.10	.00	.08
Girls	.19	.84	.04	.04	.04	.09

distribution of the measures of ten-year-old children. The following computation also is suggestive. At age ten there were 48 light and 109 dark boys. Their mean heights are 52.52 and 52.10, respectively; the standard deviations, 2.73 and 2.37; the standard deviations of the means, .39 and .23; the difference of the means, .42; the standard deviation of the difference of the means, .45. Whether this apparent difference in size is an aspect of race, or of economic status, or of some other factor is not clear.

SUMMARY

This paper has presented a brief report of measures of height, weight, width of shoulders, width of hips, depth of chest, and arm girth of Mexican school children in the elementary grades of Laredo and El Paso, Texas.

Of 1863 boys, ages five to seventeen, 18.7 per cent were classified as of light, 40.3 per cent of medium, and 41 per cent of dark skin color. Of 1815 girls of the same ages, 25.3 were classified as of light, 36.7 of medium, and 38 per cent of dark skin color. Both boys and girls of darkest classification showed a tendency to be a little smaller than those of lighter color, except perhaps in depth of chest. The average difference of means at age levels seven to fourteen, however, was less than an inch, a pound, or a centimeter. It is not clear whether this tendency on the part of darker children reflects race, economic condition, or some other factor.

Means of age groups six to fifteen for the various measures are given in the text with a table showing the distribution and variability at age ten. In addition height—age—weight tables similar to those already available for "American" children are presented.

The heights and weights of our Mexican children correspond closely to those reported from Mexico except in the case of girls of ages thirteen, fourteen, and fifteen, in which age groups a selective factor seems to have eliminated some of the larger girls from the school grades measured in this study. In general our boys are slightly heavier than the boys in the group reported from Mexico and our girls a little lighter.

Compared with the "American" children of the Baldwin-Wood tables, our Mexican children of ages six to fourteen (boys) and six to twelve (girls) are about two inches shorter, age for age, and about four to seven pounds lighter.

Except in width of hips the measures of the boys are generally greater than those of the girls up to age ten or eleven. The curves cross at eleven or twelve and recross at thirteen or fourteen. There is some suggestion from the measures that Mexican boys and girls mature somewhat earlier than the children of the Baldwin-Wood tables.

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A Scale for Measuring Attitude Toward the Question of Children's Freedom

HELEN LOIS KOCH, MAME DENTLER, BONNIE DYSART, and HELEN STREIT

THIS paper will describe (1) an attitude scale concerned with the question of the degree of freedom, independence, and self management children should be allowed, and (2), group differences in response to the scale. Sex, age, occupation, formal education, marriage or lack thereof, contact with children and reputed degree of severity or leniency in discipline are the variables whose relationship to the attitude scale results we shall attempt to reveal by means of the group comparisons.

Though we have had no hopes of constructing an instrument satisfactory for the diagnosis of the details of an individual's attitude, one of value in uncovering certain group differences did seem possible. Such a scale should be of service in the tasks of evaluating the relative effectiveness of adult or parent education programs, or of describing the lay of the land in various racial or socio-economic groups.

Method. Our scale was derived according to the method outlined by Dr. Thurstone (2). Since the work was begun several years ago and improvements over Dr. Thurstone's earlier techniques have been announced by him and others from time to time in recent years, our procedure may seem unduly cumbersome. Though cumbersome, we are inclined to believe the procedures employed are essentially dependable if the fundamental assumptions underlying attitude measurement according to the Thurstone method are granted. More extended comment on this point will be made later.

Procedure. Each of the four authors prepared a series of statements. These were then submitted to the whole group for criticism and evaluation. Those statements which, in the opinion of the group, were not possessed of the characteristics listed by Thurstone (2) and Wang (3) as desirable or which virtually duplicated others in the series were rejected. The statements believed to be worth experimenting with numbered 123.

Judges. These 123 statements, each printed on a separate card, were submitted to 200 judges for sorting into eleven piles on the basis of the degree the view expressed was lenient or stern. Thurstone now prefers a small group of highly trained judges, and with this view we are in sympathy. We believe, however, our use of many judges caused us unnecessary labor but did not very seriously mar the results. The data in table 1 describe the group as to education, sex, and wedded state. The group, it is ap-

parent, is well educated, 92 per cent being college trained and 39 per cent possessed of some experience with graduate work. Since we had reason to be mistrustful of the ability of the majority of the uneducated to make the discriminations which the sorting entailed, we limited our judges almost entirely to the college group. We should have liked a group more heterogeneous culturally because we suspected that values assigned our statements might vary somewhat with this factor. Hinckley (1), however, has not found the placement of statements to depend significantly on the judges, in the case of the issue (the social position of the negro) and the groups he dealt with.

All of the judges received carefully prepared written instructions, and most of them received, in addition, individual guidance. Where it was clear the task of sorting had been misunderstood, the results were discarded. That the scaling is dependable is suggested by the fact that when the values for the statements obtained on the basis of the sorting of two groups of 100 judges are correlated the coefficient is +.97.

TABLE 1

Classification of the judges who sorted the statements

EDUCATION	MALE		FEMALE		TOTAL (NUMBER)
	Married (number)	Single (number)	Married (number)	Single (number)	
Grade school	3	0	0	0	3
High school	6	2	4	0	12
College	10	18	39	39	106
Graduate study	28	3	18	30	79
Total	47	23	61	69	200

THE SCALES

Following, you will find thirty-three statements expressing different attitudes toward the question of children's rights and liberties.

Put a check mark (√) if you *agree* with the statement.

Put a cross (×) if you *disagree* with the statement.

If you cannot decide about a statement, you may mark it with a question mark. This is not an examination. People differ in their opinions about what is right and wrong in this issue.

Scale I

1. A young child must be disciplined until he has learned not to touch those objects in his environment which he cannot handle without damaging.
2. When a child's wants and those of an adult are in conflict, the child should receive the more consideration.
3. Parents should feel called upon to give reasons to the young child for the restrictions imposed, only when he is capable of understanding.
4. A pre-school child should never be allowed to have his own way.
5. A child who is entangled in a disciplinary problem should be allowed to explain his point of view.
6. A child should be restricted only when he is infringing upon the rights of others.
7. Adults should give no suggestions which will influence the form of a child's play constructs.

8. Play activities should never be supervised.
9. Implicit obedience is always desirable.
10. Leniency in restricting the liberties of a child is better than too much severity.
11. A child's whims and impulsive desires should never be humored.
12. Children should be given reasons for the restrictions placed upon them.
13. It is necessary to teach a child that he cannot always have his own way.
14. A pre-school child should, from the time he shows any inclination to do so, be allowed to choose the dress or suit he is to wear.
15. Children are being allowed too much freedom.
16. The wishes of the child should usually be respected.
17. I would have the child ask permission before engaging in activities that are new or strange.
18. A pre-school child should be allowed freedom of action except in matters pertaining to his health and physical safety.
19. A child should be forced to obey if he does not do immediately as he is told.
20. I would place no restriction on the child's activity except in times of grave danger to himself or others.
21. A child should be given anything he wants to eat.
22. The child should be allowed free choice in the matter of associates.
23. Matters of conduct should be decided by the parent and child together.
24. A child should be required to say "please" whenever he makes a request.
25. When a child's wants and those of an adult are in conflict, the adult should be given the more consideration.
26. Restrictions should not be imposed when they will discourage the child's spontaneous efforts.
27. A child should be taught to obey an adult unquestioningly.
28. The parent should choose the group with which the child is to associate, but the child should be allowed free choice with respect to his companions within the group.
29. A child should obey his parents because they are his parents.
30. The parent should comply with every demand of the child.
31. A child should be required to obey immediately in matters pertaining to health and physical routine.
32. Children's activities, when they seem to an adult to be destructive or wasteful, should be restricted.
33. A child's playthings are not his to do with as he pleases.

Scale II

1. Except in danger situations, a child should never be expected to obey without being given an adequate reason.
2. The child should be taught to respect the wishes of his elders.
3. When imposing restrictions upon a child, a parent should have well considered reasons and should be willing to give them.
4. A child should be required to eat everything that is set before him.
5. A child should never be forced to do a thing he does not wish to do.
6. Rigid training for obedience should be started in infancy.
7. I believe in placing upon young children but few restrictions and enforcing these strictly.
8. In all quarrels between young children adults should arbitrate.
9. A child should never be required to say "please."
10. The will of the parent should be dominant over the will of the child.
11. In his explorations of property the child should always be under close supervision.
12. A child should be given more than one chance to obey.
13. It is the parents' task to make the child want to do what is good for him.
14. A child's liberty should be restricted in danger situations only.
15. When a child is absorbed in his own immediate affairs, a parent should consider the fact before making a demand.

16. Natural forces, not individuals, should discipline the young child.
17. Little children should be forced to obey, but the control of older children should be less exacting.
18. Within the limits of justice and safety, a young child in his play should be free from adult interference.
19. The older pre-school child should be allowed a certain amount of freedom in making decisions and assuming the consequences.
20. A child should be allowed to do as he wishes in all things.
21. A child should be given a choice in every matter possible.
22. A child should always be supervised by his parents in his work activities.
23. From a selection of foods chosen by an adult as suitable for the young child, the child should be allowed to choose freely.
24. The "Puritan" method of bringing up children is the best method.
25. If a child does not comply at once with a request in matters pertaining to health, he should be forced to.
26. The child's own limitations in relation to his physical environment should be all that should restrict him in his play activities.
27. The whims of the child should be repressed at all times.
28. Within certain selected situations, a child should be allowed to assert his personal likes and dislikes.
29. A child should be permitted to do as he wishes with his own playthings.
30. A child should never be allowed openly to disagree with his parents.
31. In the face of an emergency situation the immediate obedience of the child should be required.
32. A child should be encouraged but not required to say "please" when he makes a request.
33. A child should not be allowed to destroy or abuse his own playthings.

Selection of statements. From the 123 scaled statements 66 were chosen—i.e., two series of 33 each. The bases of selection were primarily those of scatter, relatively low Q value, brevity, and similarity of rating at the hands of the two groups of 100 judges. Since it was our intention that the statements should scatter rather evenly over the scale, in most cases a group of three whose values spread well over the interval were chosen from each of the 11 units. This was done for each of the two scales.

The scale and Q values for each statement are given in table 2. The Q's are, doubtless, larger than they would have been, had we employed a few highly trained judges. They are of about the order of magnitude of those published by Thurstone and Chave (2) for their scale on attitude toward religion.

Reliability of the scales. These somewhat large Q's may not be attributable entirely, however, to untrained judges but may reflect a quality of vagueness in the statements. This may be responsible also, in part at least, for the none too high correlation we obtained between the scores on our two scales. This coefficient, based on the opinions of 233 adults representing a rather heterogeneous population, was +.681. It is possible that, although the statements were scaled along a given diagonal, when this diagonal is not emphasized to the degree it is in the task of sorting, other dimensions become more apparent. We were, for example, suspicious for a time of the high frequency with which certain statements of intermediate value tended to be checked. This one would expect to have a leveling effect. To test our hypothesis, we re-scored all papers omitting in Scale I, Statements 5, 12,

13, 16, and 32; and in Scale II, Statements 2, 13, 15, 18, and 31. Regularity in the spacing of items was thus lower with each other, to our surprise, than did those for the original instruments.

TABLE 2

Scale values, Q, and popularity values of the statements in Scales I and II

STATEMENT NUMBER	SCALE I		SCALE II		SCALE I				SCALE II			
	Scale value	Q	Scale value	Q	Statement number	Scale value	Q	Relative frequency of checking	Statement number	Scale value	Q	Relative frequency of checking
1	7.09	2.42	2.59	2.89	30	.55	.55	.004	20	.54	.55	.00
2	2.56	2.47	7.72	2.59	21	.63	.63	.004	5	.67	.67	.04
3	6.00	2.00	5.25	1.69	8	.74	1.07	.02	9	.91	1.66	.05
4	10.43	.57	10.01	1.90	22	1.14	1.52	.04	16	1.23	2.28	.14
5	4.87	2.29	.67	.67	7	1.62	2.04	.05	26	1.54	1.59	.13
6	3.10	2.84	9.44	2.00	20	1.98	1.68	.18	29	1.81	2.04	.20
7	1.62	2.04	5.75	2.12	14	2.48	2.49	.37	21	2.14	2.63	.60
8	.74	1.07	8.77	2.71	2	2.56	2.47	.29	14	2.32	2.23	.13
9	9.65	1.84	.91	1.66	18	2.72	2.30	.31	1	2.59	2.89	.17
10	4.39	1.64	9.81	1.98	6	3.10	2.84	.18	18	3.38	3.01	.80
11	9.76	1.84	8.16	2.03	16	3.36	2.52	.66	23	3.79	2.92	.60
12	4.24	2.38	3.95	2.80	26	3.93	2.65	.66	12	3.95	2.80	.62
13	5.95	1.74	5.62	1.81	12	4.24	2.38	.72	15	4.24	2.59	.88
14	2.48	2.49	2.32	2.23	10	4.39	1.64	.72	19	4.41	2.38	.80
15	7.83	2.52	4.24	2.59	5	4.87	2.29	.92	32	4.63	2.24	.72
16	3.36	2.52	1.23	2.28	23	5.27	1.37	.58	28	5.01	1.98	.81
17	6.64	2.17	7.61	2.45	28	5.44	1.29	.79	3	5.25	1.69	.89
18	2.72	2.30	3.38	3.01	13	5.95	1.74	.92	13	5.62	1.81	.86
19	10.03	1.50	4.41	2.38	3	6.00	2.00	.58	7	5.75	2.12	.58
20	1.98	1.68	.54	.55	17	6.64	2.17	.51	31	6.24	2.58	.84
21	.63	.63	2.14	2.63	32	6.75	2.15	.69	33	7.17	2.60	.68
22	1.14	1.52	8.41	2.36	1	7.09	2.42	.65	17	7.61	2.45	.13
23	5.27	1.37	3.79	2.92	31	7.32	2.49	.56	2	7.72	2.59	.74
24	8.04	2.32	10.29	.96	15	7.83	2.52	.24	25	7.81	2.53	.42
25	8.22	2.02	7.81	2.53	24	8.04	2.32	.26	11	8.16	2.03	.26
26	3.93	2.65	1.54	1.59	25	8.22	2.00	.17	22	8.41	2.36	.15
27	10.30	.85	10.28	.97	33	8.51	2.34	.24	8	8.77	2.71	.08
28	5.44	1.29	5.01	1.98	9	9.65	1.84	.31	30	9.36	1.96	.11
29	9.85	1.43	1.81	2.04	11	9.76	1.84	.08	6	9.44	2.00	.41
30	.55	.53	9.36	1.96	29	9.85	1.43	.14	10	9.81	1.98	.21
31	7.32	2.49	6.24	2.58	19	10.03	1.50	.12	4	10.01	1.90	.17
32	6.75	2.15	4.63	2.24	27	10.30	.85	.10	27	10.28	.97	.05
33	8.51	2.34	7.17	2.60	4	10.43	.57	.04	24	10.29	.96	.02

sacrificed, but both instruments were altered in the same areas. The scores on the two abridged scales correlated

Another hypothesis that presented itself to us—i.e., that the inter-scale r might have been depressed by differ-

ences in the popularity values of statements in corresponding areas of the scale—was likewise found to have little in the way of evidence to support it. If for the items whose values fall in the various intervals of the scale, we average the measures of relative frequency of endorsement and then compare these averages for the two scales, we do not find striking differences, except in one case, which is due in part to our grouping procedure. (See table 3.) When the grouping according to interval is abandoned

TABLE 3

Average popularity value of statements in corresponding areas of Scales I and II

AREA OF SCALE	SCALE I	SCALE II
0- .99	.01	.03
1.00- 1.99	.09	.16
2.00- 2.99	.32	.30
3.00- 3.99	.50	.67
4.00- 4.99	.79	.80
5.00- 5.99	.76	.79
6.00- 6.99	.59	.84
7.00- 7.99	.48	.49
8.00- 8.99	.22	.16
9.00- 9.99	.18	.24
10.00-10.99	.09	.08

and the popularity values of each successive three statements are averaged, the data for the two scales are rather similar. The averages for the fourth group of three show the greatest disparity.

Limitations of the usefulness of the scales. Finally, it occurred to us that we might have made false assumptions regarding the boundaries of usefulness of our scales. Even if we assume our respondents entirely frank, we are doubtful, for instance, of the suitability of the scales for use with the less educated groups. Perhaps with these groups we are guilty of an absurdity virtually parallel to asking subjects to check a scale written in a foreign language. Are the less educated, or perhaps duller individuals sufficiently discriminating with respect to linguistic subtleties to appreciate even the grosser differences expressed by the statements? We noted, for example, that those of our subjects with the least schooling checked many more of the items than did the more educated. (See table 4.) The statements, moreover, which the former affirmed expressed their opinions were scattered more widely over the scale. For each individual we derived a consistency index—i.e., the average deviation of the values of the statements endorsed by him. These average deviations are clearly greater for the less educated groups than for the more educated. (See table 4.)

If the statements were sufficiently comprehended, we should be obliged to conclude that the attitude people have with respect to the issue of concern to us does not express itself in congruent endorsements, for even our educated subjects could scarcely be described as highly consistent. It seems not unlikely, of course, that instead of being guided by a broad philosophy or carefully considered generalizations, people think largely in terms of small segments of behavior and more or less specific situations. This characteristic may be emphasized in the case of the question at hand because most individuals have had a certain amount of direct and intimate contact with children. These specific personal experiences, with their tangles

of values, may tend to militate against untempered bias, which simulates generalization because of the lack of analysis, and, on the other hand, do little to stimulate effective generalization, which would involve the square facing of certain philosophical issues and a synthesizing of the units of analysis.

Effect of number of statements presented. Though the comment may seem somewhat irrelevant at this point, we cannot refrain from calling attention to a tendency we noted incidentally in our data and for whose effect we had to adjust in subsequent analyses. Most of our subjects were presented with a blank containing the 123 statements and then were scored merely on the basis of the items designated for inclusion in Scales I and II. A limited number of individuals (about 125), however, were given a test blank containing only the 33 statements of Scale I. When the returns from parallel sex, education, and marriage groups were compared, we noted that the subjects given the opportunity of selecting from 123 statements endorsed fewer than those whose selection was limited to 33 statements. Our belief—though the tendency is not so unequivocal—is that the former were also more consistent. The cases, in any one group are too few to justify extended presentation of our data; but the trend, at least in the case of the index, number of items approved, is very consistent. This observation needs confirmation; and if corroborated, would suggest a modification in the procedure of administering attitude scales. Perhaps, even though the statements believed on the basis of other criteria to be the more diagnostic are the only ones used in computing the attitude score, the presentation of the subject with a large array of statements may have a salutary effect through refining his discriminations. More work needs to be done to clarify the questions both of the number of

TABLE 4

Mean number of items checked by an individual and mean of the average deviations of the score values of an individual's checkings—Sex, education, and marriage groups—Scale I

EDUCATION	FEMALE										MALE									
	Married					Single					Married					Single				
	Number of cases	Mean number of items checked	σ_m	Mean average deviation of checkings	σ_m	Number of cases	Mean number of items checked	σ_m	Mean average deviation of checkings	σ_m	Number of cases	Mean number of items checked	σ_m	Mean average deviation of checkings	σ_m	Number of cases	Mean number of items checked	σ_m	Mean average deviation of checkings	σ_m
Grades	21	18.31	.96	1.88	.08	1	18.00		1.60		12	21.62		1.96		3	13.17		1.83	
High school	41	17.33	.68	1.75	.06	19	19.71	.85	1.96	.07	25	20.06	.66	1.94	.04	10	18.90		1.82	
College	57	13.04	.56	1.39	.04	31	12.82	.61	1.33	.05	12	13.33		1.50		25	14.50	.52	1.52	.07
Graduate study	29	10.74	.51	1.22	.04	33	10.77	.85	1.29	.07	36	10.64	.72	1.33	.07	4	14.75		1.64	

TABLE 5

Distribution of scores—Scale I

SCALE	FREQUENCY			DIAGRAM
	Female	Male	Total	
3.50	1	1	2	xx
3.75	4	1	5	xxxxx
4.00	8		8	xxxxx xxx
4.25	11	4	15	xxxxx xxxxx xxxxx
4.50	10	5	15	xxxxx xxxxx xxxxx
4.75	20	11	31	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx x
5.00	29	14	43	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxx
5.25	30	11	41	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx x
5.50	24	13	37	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xx
5.75	33	20	53	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxx
6.00	23	10	33	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxx
6.25	10	15	25	xxxxx xxxxx xxxxx xxxxx xxxxx
6.50	14	11	25	xxxxx xxxxx xxxxx xxxxx xxxxx
6.75	8	5	13	xxxxx xxxxx xxx
7.00	3	2	5	xxxxx
7.25	1	1	2	xx
7.50	2		2	xx
7.75		1	1	x
8.00	1	1	2	xx
8.25				
8.50		1	1	x
Total number..	232	127	359	
Mean score....	5.54	5.78	5.62	
σ_{dist}.....	.77	.84	.82	
σ_m.....	.05	.08	.04	

items that ought to be presented and the effect upon findings of the number of items scored.

Distribution of scores. To test the suitability of our instruments for revealing certain group differences, Scale I was given to 359 adults in widely scattered parts of the country, Chicago, however, furnishing a lion's share of the returns. The composition of the group with respect to sex, age, single or married state, education, and occupation is described in the case counts of table 11. The scores obtained ranged from 3.50 to 8.50, the possible range being from .55 to 10.43. The mean score was 5.62. The distribution seemed characterized by a bimodality. (See table 5.) Whether this is attributable to chance, or is an artifact due to the scale, or to the selection of subjects, is not entirely clear; but we suspect the latter. A heavy weighting of student and professional groups—those with liberal tendencies—may be responsible for the apparent division. This hypothesis is supported by the fact the second mode is in the liberal direction. Because of the difficulty the uneducated had in interpreting the statements, we did not reach as many of this group as we desired.

Scale II was given to only 233 indi-

TABLE 6

Distribution of scores—Scale II

SCALE	FREQUENCY			DIAGRAM
	Female	Male	Total	
3.25	2		2	xx
3.50				
3.75	1	1	2	xx
4.00	6	2	8	xxxxx xxx
4.25	7	5	12	xxxxx xxxxx xx
4.50	15	9	24	xxxxx xxxxx xxxxx xxxxx xxxx
4.75	21	9	30	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx
5.00	35	9	44	xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxxx xxxx
5.25	19	7	26	xxxxx xxxxx xxxxx xxxxx xxxxx x
5.50	19	7	26	xxxxx xxxxx xxxxx xxxxx xxxxx x
5.75	19	3	22	xxxxx xxxxx xxxxx xxxxx xx
6.00	17	5	22	xxxxx xxxxx xxxxx xxxxx xx
6.25	8	1	9	xxxxx xxxx
6.50	6	2	8	xxxxx xxx
6.75	1	1	2	xx
7.00	2	1	3	xxx
7.25	1		1	x
Total number.	179	62	241	
Mean score....	5.37	5.24	5.33	
$\sigma_{dist.}$.....	.70	.71	.70	
σ_m	.05	.09	.05	

viduals. This group overlapped that which responded to Scale I. The student and professional groups constituted proportionally more of the respondents to Scale II than to Scale I. The score range was correspondingly restricted, extended only from 3.25 to 7.25. The mean score was 5.38. (See table 6.) The mode is slightly off center in the liberal direction, a finding which the composition of the group would lead us to expect. No bimodality appears in the distribution.

TABLE 7

Mean attitude score for an individual—Sex and education groups—Scale I

EDUCATION	FEMALE			MALE		
	N	M	σ_m	N	M	σ_m
Grades	22	6.30		15	6.13	
High school	60	5.98	.09	35	6.09	.11
College	88	5.38	.07	37	5.60	.13
Graduate study	62	5.11	.09	40	5.54	.15

TABLE 8

Mean attitude score for an individual—Sex and education groups—Scale II

EDUCATION	FEMALE			MALE		
	N	M	σ_m	N	M	σ_m
Grades	11	6.21		2	6.37	
High school	36	5.76	.11	11	5.78	
College	76	5.25	.07	13	5.29	
Graduate study	56	5.13	.09	36	4.93	.10

Education. Among the group comparisons, those which show the most clear-cut differences are the ones concerned with education. (See tables 7–11.) In the case of both the men and the women, the greater the amount of academic education, the more liberal the opinion expressed. There is a steady regular increase through the four groups, grade school, high school, college, and graduate study. This finding seems reasonable and suggests that education makes for a more liberal view of the rights and capabilities of children, though it is, of course, possible that intelligence rather than education is the really significant determinant of the group differences observed. We have no data that could be brought forward to alter this deadlock of hypotheses.

Opinion and conduct. Perhaps education, if it plays a rôle in the responses to our scale, operates largely through calling attention to enlightened opinion, instead of in more significant and subtle ways. In other words, the more educated may know the preachings of the educational philosophers and child psychologists but actually pay little regard to these preachings in their own practices. Since our

results give no direct clues in regard to practice, we do not know to what degree opinion and conduct are harstern or lenient in their discipline of children. Seventy-one of the former and 40 of the latter responded to our

TABLE 9

Mean attitude score for an individual—Sex, education, and marriage groups—Scale I

EDUCATION	FEMALE						MALE					
	Married			Single			Married			Single		
	N	M	σ_m	N	M	σ_m	N	M	σ_m	N	M	σ_m
High school	41	5.92	.12	19	6.09	.14	25	6.05	.14	10	6.13	
College	57	5.38	.09	31	5.19	.10	12	5.85		25	5.47	.16
Graduate study	29	4.75	.12	33	4.72	.11	36	5.50	.14	4	5.88	

TABLE 10

Mean attitude score for an individual—Sex, education, and marriage groups—Scale II

EDUCATION	FEMALE						MALE					
	Married			Single			Married			Single		
	N	M	σ_m	N	M	σ_m	N	M	σ_m	N	M	σ_m
Grades	11	6.21					1	6.13		1	6.63	
High school	33	5.71	.11	3	6.21		6	5.66		5	5.72	
College	51	5.26	.09	25	5.26	.10	12	5.35		1	4.63	
Graduate study	28	4.87	.11	28	5.40	.11	35	4.93	.10	1	4.63	

TABLE 11

Mean attitude score for an individual—Sex, education, age, and marriage groups—Scale I

MARRIED OR SINGLE	EDUCATION	FEMALE						MALE					
		29−		30-39		40+		29−		30-39		40+	
		N	M	N	M	N	M	N	M	N	M	N	M
Married	Grades	2	5.88	4	5.88	15	6.55	0		3	6.46	9	6.70
	High school	10	5.80	13	5.94	18	6.00	7	6.52	9	5.88	9	5.85
	College	14	5.50	30	5.38	13	5.62	2	6.25	3	5.05	7	6.13
	Graduate study	10	5.05	14	4.62	5	4.28	4	4.88	22	5.65	10	5.41
Single	Grades	1	5.00	0		0		2	6.13	0		1	5.62
	High school	14	6.08	2	5.63	3	6.37	6	6.21	1	5.88	3	6.21
	College	20	5.20	7	6.08	4	5.32	24	5.44	0		1	6.13
	Graduate study	16	5.50	9	5.43	8	5.29	3	6.71	1	3.62	0	

monious. We tried to get some light on the question by appealing to our friends for help in the location of individuals reputed to be conspicuously scale. Table 13 provides a rough description of the results. It is clear that the critical ratios (table 14) are large enough to justify confidence in

the group differences revealed. The lenient fall below the average based upon all of our subjects; the stern, above. In the case of Scale II, only 5 per cent of the lenient exceeded the mean of the stern; whereas in the case of Scale I, 15 per cent did. Since the standard of selection for the representatives of the extreme groups was not constant, the relationship described is doubtless more marked than our results indicate.

Sex differences. In virtually all of the comparisons between the sexes involving Scale I (see tables 7, 9, and 11), the men seem a little less lenient than the women. Not only is this difference shown when all data are pooled, but also when groups segregated on the basis of education, wedded state, age, or occupation are compared. This finding, too, while the differences are not great, is in accord with tradition. The fact that the results with Scale II should not show such a clear-cut trend is perhaps to be accounted for in terms of the limited number of males coöperating.

TABLE 12

Mean attitude score for an individual—Sex, education, age, and marriage groups—Scale II

MARRIED OR SINGLE	EDUCATION	FEMALE						MALE					
		29−		30-39		40+		29−		30-39		40+	
		N	M	N	M	N	M	N	M	N	M	N	M
Married	Grades			2	5.88	9	6.27	0				1	6.13
	High school	7	5.48	10	5.58	16	5.91	1	7.37	2	5.38	3	6.13
	College	12	5.36	28	5.13	11	5.36	1	5.13	4	5.44	7	5.76
	Graduate study	9	5.10	14	4.84	5	4.53	4	4.82	21	5.26	10	5.18
Single	Grades							1	6.63				
	High school	1	5.63			2	6.50	3	5.63	1	5.63	1	6.13
	College	15	5.34	6	5.13	4	5.13	1	4.63				
	Graduate study	11	5.54	9	5.57	8	5.00	0		1	4.63		

TABLE 13

Means, sigmas, and sigmas of the means of the attitude scores of those reputed to be lenient or stern in their discipline of children—Scales I and II

GROUPS	SCALE I				SCALE II			
	N	M	$\sigma_{dist.}$	σ_m	N	M	$\sigma_{dist.}$	σ_m
Lenient	40	5.02	84	.13	40	4.98	62	.10
Stern	71	5.84	78	.09	71	5.79	72	.09
All subjects	363	5.62	82	.04	241	5.33	70	.05

TABLE 14

Critical ratios—Discipline groups—Scales I and II

COMPARISON	SCALE I	SCALE II
Stern—lenient	5.04	6.25
Stern—all subjects	1.23	6.11
Lenient—all subjects	4.56	3.12

Occupation. Among the occupation groups the order from liberal to less liberal is student, executive—professional, small-business—clerical, and trades—unskilled—labor. (See table 15.) We had felt that economic security might make for more tolerance and better family relations, but our results seem more readily interpretable in terms of an education or even an intelligence factor rather than any essentially economic one, though we grant it is difficult to separate the three. That education is very likely active is suggested by the fact that the student group, which, taken as a whole, is probably not so secure but quite as intelligent as is the professional and business executive group, is the more liberal of the two.

Age and marriage. Analyzing our results to reveal the influence of age and of marriage, we uncovered nothing of significance. No legitimate combining of the groups shown in tables 7 to 12 revealed any consistency; and certainly these tables show none.

Contact with children. The effect of the nature or the extent of the adult's contacts with children, we attempted to expose by group comparisons; but, again, limited numbers prevented us from disentangling the variable satisfactorily from others. Our classes, moreover, were not discrete; and hence, if a subject placed himself in several categories, we listed him in each. The results, whatever they may mean, are consistent both for males and females, in revealing individuals having no contact with children to be the most stern and teachers rather lenient.

TABLE 15

Mean attitude score for an individual in various occupational groups—Scale I

OCCUPATIONS	FEMALE		MALE	
	N	M	N	M
Professional and business executive	63	5.68	72	5.29
Small business and clerical	16	5.94	17	5.85
Trades and unskilled labor	20	6.33	3	5.88
Student	28	5.47	18	5.41
Homemaker			126	5.65

TABLE 16

Mean attitude score of individuals classified according to the nature of their adult contacts with children

NATURE OF CONTACT WITH CHILDREN	MALE		FEMALE	
	N	M	N	M
Parent	65	5.74	117	5.58
Sib	35	5.69	33	5.64
Teacher	15	5.43	70	5.38
Miscellaneous	23	5.35	47	5.32
No contact	20	5.95	25	5.79

Parents and sibs seem to fall somewhere between these groups. The miscellaneous group, including pediatricians, clinicians, playground directors, neighbors, etc., score lowest of all. We are not sure to what extent formal education, rather than the nature of the specific contacts with children, is responsible for the findings shown in table 16. That the former is not the whole story is suggested by the fact that the group professing to have no contact with children is not an uneducated one.

SUMMARY

A description was given of two forms of a scale for measuring attitude toward the question of the freedom, independence, and self-management children should be allowed.

The two forms described correlated with each other to the extent of +.681.

The average deviation of the scale values of the statements endorsed by an individual as well as the number of items approved, tended to vary inversely as the amount of formal education of the respondents. It is possible, however, that intelligence rather than education was the major determinant of the finding.

Our female subjects tended to be more liberal than did the males, and the best educated than the less well educated.

Groups based upon occupational status or nature of adult contact with children showed some consistent differences in attitude score; but it was not possible to disentangle satisfactorily the variables underlying the group classifications from such factors as schooling or intelligence. Those professing to have no contact with children tended to be stern, whereas the professional-executive and especially the teaching groups tended to be rather lenient.

Neither age, within the limits we explored, nor single or married state, seemed to affect conspicuously attitude scores.

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Children's Preferences Among Play Materials as Determined by the Method of Paired Comparisons of Pictures

THOMAS F. VANCE AND LOUISE T. MCCALL

INVESTIGATORS who have concerned themselves with the problem of children's preferences for different play materials have, for the most part, used the method of observing the children in their spontaneous play. Some of the reports of such investigations cite certain limitations of this method. Bridges (2) (3) stated that the children were hindered or probably forced to use material they did not prefer because the material they actually preferred was being used by other children. Bott (1) claimed that "imitation and leadership were probably the most important factors in determining children's choice and use of materials" and that the limited number of materials provided might also have an influence upon the child's choice, due to the necessity of substitution. Farwell (4) considered the addition of new materials an influencing factor in her study; the children seemed to prefer the new in preference to the old. Adult suggestion and the child's love of color may also influence his preferences.

Since looking at pictures is an activity which appeals to all children, and the ability to recognize single objects in pictures and to associate them with the real object comes, according to Stern (9) as early as 19 months of age, it occurred to the writers that a method might be developed which would make use of this natural and universal interest. The method of paired comparisons of pictures was selected.

The purpose of the investigation was twofold: to determine the preferences of a group of preschool children for a series of pictures of play materials and to compare this order of preference with the order shown in spontaneous play on the playground and in a somewhat restricted play-room.

The subjects were 17 girls and 15 boys ranging in age from three years, six months to six years, four months. Fifteen of these were selected at random from the older group of children enrolled in the Iowa State College Nursery School. The remaining 17 were former pupils of the nursery school; 13 of these, at the time of the study were enrolled in the Ames Kindergarten and 4 were staying at home. The children were from the homes of the professional and business classes. The I.Q.s ranged from 96 to 150 with an average of 114.4.

The play materials selected for this study were chosen from the used materials of the Iowa State College

Nursery School. Consequently the children had had ample opportunity to become familiar with them. These were classified into 8 groups: playground apparatus, toys for active play, blocks, plastic materials, manipulative materials, and toy animals. Six specific play materials or toys were selected for each group, making a total of 48 individual items.

These materials were photographed by the college photographer. Similarity in background, lighting and proportion were considered. The pictures were mounted separately on neutral gray card-board $5\frac{1}{4}$ by $6\frac{1}{4}$ inches. They were numbered and lettered appropriately to facilitate presentation and tabulation.

A small stand 14 x 7 inches was designed for presenting the pictures. This was elevated 2 inches in the back, thus making a slanting position toward the child. A small molding was tacked to the lower edge and to this was hinged a piece of glass, the edge of which was bound with tape. This glass extended one-half an inch over the top edge of the board which made it easy to lift up and down thus simplifying the process of placing the pictures under it. The board was covered with a neutral gray background.

The pictures were presented to the children at the various schools which they happened to be attending. In all cases the rooms were well ventilated and lighted, and the children were as far removed from distractions as possible. The tables and chairs were adjusted to the child's stature. The comfort of the child, his position and the effect of the light on the pictures were made as optimum as possible.

A preliminary test, using the pictures of one group of play materials was given to ten of the nursery school children. These pictures were presented according to the order recommended by Seashore (8), comparing each picture consecutively with every other one.

An examination of the results showed a general tendency for the subjects to choose the new picture in preference to the one that was shown consecutively. Such remarks as "Why do you keep showing that one?" and "Why there's the same picture again" were quite common. This suggested the advisability of working out a new order of presentation in which no picture was shown twice in succession at the same sitting.

The general plan of procedure was to give each child one complete test which was followed by a retest, not sooner than one week, nor later than three. One complete test consisted of a comparison of each specific play material in a group with each of the other 5 within its own group. The material preferred first in each group was then compared with the first preference of every other group. For the younger children the test was divided into 4 parts and given on consecutive days whenever possible, but for the kindergarten children and those tested in the homes the test was completed in 3 sittings. The same procedure was followed for the retest.

Upon presenting the pictures to the subject for comparison, the examiner allowed the child to look at them for a few seconds. Then if he did not call

spontaneously the name of the play material, he was asked: "What do you see in these pictures to play with?" A record was kept of the ones the child could not name. If he seemed unable to name the material he was asked, "What do you do when you play with these?" If the child could name or could tell how to use the equipment, he was checked as being able to recognize that material. The next question was, "Which one of these playthings do you like to play with best?" Some children were more hesitant than others about answering so the direction took the form of, "Place your finger on the one you like to play with best." This usually brought about a response, however, in some cases the finger was placed on one picture and then on the other. In a case of this kind the examiner repeated her request with a little more emphasis upon the word "one." After this the first picture pointed out by the child was considered his preference. Should a child contend that he liked both, he was asked, "If you were to play with both of these playthings which one would you play with first?" His choice then made was considered his preference.

In addition to the paired comparisons of pictures, an observation study was conducted of the child's choice of certain of the actual play materials. Fourteen of the same nursery school children, 6 girls and 8 boys, who were used in the picture test were allowed to play for 15 minutes, one at a time, in a room in which the plastic group of materials had been arranged. These materials were arranged as nearly like the pictures as possible and grouped about the room so the child would have all in full view upon coming through the door. He was told, "Here is a room full of playthings; you may play with whatever you want to." If he asked what to do or seemed at a loss as to what to do next, the examiner merely made the statement, "Play with whatever you like." The position of the materials was changed several times in order to equalize any possible advantage of one position over another. Bridges (3) method was used for recording the name of each material used, its order of use, and the amount of time spent with each. The findings of this controlled observational study were compared with the group preferences for the same group of play materials as determined by the method of paired comparisons of pictures.

As a further phase of the present investigation, the writers attempted to determine if the play materials which the subjects had at home influenced their choices of materials in the picture test. Information was collected through an interview with the mothers regarding the kinds of materials that were accessible in the homes. The mothers were also asked to rank, from the list of play materials used in the present study, the child's preferences for those materials found in the home. The specific materials were ranked within each group, and then the first preferences of each group ranked with the first preferences of the other groups. This later information was purely opinion of the mothers, but due to daily observations of the children's activities, it was thought that the mother's

opinions might prove worthy of comparisons with the children's preferences as determined by the other methods.

RESULTS

The picture test. Reliability of the method: The reliability of the method of paired comparison of pictures was determined by correlating the choices the children made in the first test with the choices they made in the retest. The total number of times each of the 42 specific materials was chosen in the first was correlated with the total number of times each of these was chosen in the retest.

The correlation for the four-year-old group was .78 ±04; for the five-year-old group, .68 ±.05; for the six-year-old group, 95 + .09; and for the total group, .87 ±.02. It is to be noted that the correlation for the five-year-old group is somewhat lower than for the other two groups. This may be due in part to three things: (1) the group was much smaller, (2) three out of seven of the subjects in this group were tested in their homes where it was impossible to control conditions as well as at school, and (3) this group also contained the three children who did not coöperate readily in the testing, and who became negative toward the last of the testing procedure.

Preferences among play materials. The total number of times each specific material was chosen in the first picture test was averaged with the total number of times the same material was chosen in the retest. These averages were used as the basis for ranking the preferences among play materials, the highest average being considered first preference; the next highest, second preferences, and so on down to the least preferred.

In table 1 is shown the order of preference for each specific material within its own group by children of different ages. The materials are listed in order from the most preferred to the least preferred. When the averages of two or more materials were the same, these were grouped together showing a tie for the position. The three ages show the closest agreement with the large toys for active play, among which, with one exception, their preferences are identical. The greatest disagreement is among transportation miniature toys. In the latter case, the averages from which the rankings were determined ran very close together, showing that there were very few decided preferences for any particular toy within this group of play materials.

Swings and rings rank high at all ages. The jungle gym is popular; while the packing boxes are the least preferred at all ages. There is a decided preference for the tricycle, sled and rocking horse chair at all ages, while the kiddy car has the lowest rank for all the groups. Small cubes hold an important place in all age groups. When comparing the plastic materials it may be noted that the first three preferences remain the first 3 for all ages and the last 3 are the same for all ages. Clay, work-table and tools, and water-colors are preferred to easel and paints, black-board and chalk, and scissors and paper.

Among the manipulative materials, the popularity of the ball is shown. Among the housekeeping materials.

TABLE 1

Order of preference for each specific play material within groups by children of different ages

FOUR-YEAR-OLDS	FIVE-YEAR-OLDS	SIX-YEAR-OLDS
Playground apparatus		
Swings and rings	Bar	Swings and rings
Jungle gym	Swings and rings	Jungle gym
Slide	Jungle gym; see-saw	Slide; see-saw
See-saw; bar	.....	.....
.....	Slide	Bar
Packing boxes	Packing boxes	Packing boxes
Large toys for active play		
Tricycle	Tricycle	Tricycle
Sled	Sled	Sled
Rocking-horse chair	Rocking-horse chair	Rocking-horse chair
Wheelbarrow	Wheelbarrow	Wagon
Wagon	Wagon	Wheelbarrow
Kiddy kar	Kiddy kar	Kiddy kar
Blocks		
Patty Hill floor blocks	Small cubes	Small cubes
Blocks and pegs	Bricks, etc.	Blocks and pegs
Small cubes	Hollow boxes	Patty Hill floor blocks
Hollow boxes	Blocks and pegs	Nest of boxes
Bricks, etc.	Patty Hill floor blocks; nest of boxes	Bricks, etc.
Nest of boxes	.....	Hollow boxes
Plastic materials		
Worktable and tools	Clay	Clay
Water colors	Worktable and tools	Worktable and tools
Clay	Water colors	Water colors
Easel and paints	Scissors and paper	Easel and paints
Blackboard and chalk	Blackboard and chalk	Blackboard and chalk
Scissors and paper	Easel and paints	Scissors and paper
Manipulative materials		
Peg-board ($\frac{1}{4}$ in.)	Ball	Ball
Ball	Peg-board ($\frac{1}{8}$ in.)	Tower
Tower	Tracing frames	Beads
Beads	Tower	Peg-board ($\frac{1}{4}$ in.)
Tracing frames	Beads	Tracing frames
Peg-board ($\frac{3}{4}$ in.)	Peg-board ($\frac{3}{4}$ in.)	Peg-board ($\frac{3}{4}$ in.)

TABLE 1—*Continued*

FOUR-YEAR-OLDS	FIVE-YEAR-OLDS	SIX-YEAR-OLDS
	Transportation miniature toys	
Bus	Train	Train; aeroplane
Tractor	Truck	.....
Truck	Car	Tractor
Train	Tractor; bus	Bus
Car	.....	Car
Aeroplane	Aeroplane	Truck
	Housekeeping materials	
Washing equipment	Doll buggy	Telephone; doll buggy
Doll buggy	Tea-set, table and chair	.....
Telephone	Telephone; doll bed	Washing equipment
Tea-set, table and chair	.....	Tea-set, table and chair
Doll bed	Washing equipment	Doll bed
Doll	Doll	Doll
	Toy animals	
Small animals	Small animals	Small animals
Cow	Teddy bear	Teddy bear
Sheep	Elephant; sheep; duck	Elephant
Elephant	.....	Duck on rollers
Duck on rollers	.....	Sheep
Teddy bear	Cow	Cow

the doll buggy and the telephone rank high at all ages. There is a uniform low preference shown for the doll.

Table 2 shows the order of preference for each specific material within its group according to sex and total group preference. The most noticeable differences are: (1) girls prefer the smaller blocks, while boys choose the larger ones; (2) interest in the work-table is high for boys, but low for girls; (3) girls show more preference for scissors and paper; and (4) boys rank the doll buggy, washing equipment, and doll as their lowest preferences among housekeeping materials, while they rise to first preference for girls.

The order of preferences among the materials as shown for the total group is similar to that found for the age groups. The swings and rings, tricycle, small cubes, clay, ball, train, doll buggy, and small animals hold first preference for their respective groups of materials. The packing boxes, kiddy car, nest of cubes, blackboard and chalk, peg-board, car, doll, and cow are placed as least preferred among their respective groups.

The order of preference for the eight different classes or groups of play materials for all children is as follows: plastic materials, toy animals, housekeeping materials, playground apparatus, large toys for active play, manipulative materials, transportation miniature toys, and blocks. In compar-

TABLE 2

Order of preference for each specific play material within groups by different sexes and by total group

BOYS	GIRLS	TOTAL GROUP
Playground apparatus		
Jungle gym	Swings and rings	Swings and rings
Swings and rings	See-saw	Jungle gym
Bar	Jungle gym	See-saw
Slide	Bar	Bar
See-saw	Slide	Slide
Packing boxes	Packing boxes	Packing boxes
Large toys for active play		
Sled	Tricycle	Tricycle
Tricycle	Rocking-horse chair	Sled
Wagon	Sled	Rocking-horse chair
Wheelbarrow	Wheelbarrow	Wagon
Rocking-horse chair	Wagon	Wheelbarrow
Kiddy kar	Kiddy kar	Kiddy kar
Blocks		
Hollow boxes	Small cubes	Small cubes
Patty Hill floor blocks	Blocks and pegs	Blocks and pegs
Bricks, etc.	Patty Hill floor blocks	Patty Hill floor blocks
Small cubes	Nest of boxes	Hollow boxes
Blocks and pegs	Bricks, etc.	Bricks, etc.
Nest of boxes	Hollow boxes	Nest of boxes
Plastic materials		
Worktable and tools	Water colors	Clay
Clay	Clay	Worktable and tools
Water colors	Scissors and paper	Water colors
Blackboard and chalk	Easel and paints; and work-table	Easel and paints
Easel and paints	Blackboard and chalk	Scissors and paper
Scissors and paper		Blackboard and chalk
Manipulative materials		
Ball	Ball	Ball
Peg-board ($\frac{1}{2}$ in.)	Peg-board ($\frac{1}{2}$ in.)	Peg-board ($\frac{1}{2}$ in.)
Tower	Beads; tower	Tower
Tracing frames; beads	.....	Beads
.....	Tracing frames	Tracing frames
Peg-board ($\frac{3}{4}$ in.)	Peg-board	Peg-board ($\frac{3}{4}$ in.)

TABLE 2—*Continued*

BOYS	GIRLS	TOTAL GROUP
	Transportation miniature toys	
Tractor	Train	Train
Train	Truck	Tractor
Aeroplane	Bus	Bus
Truck	Car	Truck
Bus	Tractor; aeroplane	Aeroplane
Car	.....	Car
	Housekeeping materials	
Telephone	Doll buggy	Doll buggy
Doll bed	Washing equipment	Telephone
Tea-set, table and chair	Telephone	Washing equipment
Doll buggy	Doll	Tea-set, table and chair
Washing equipment	Tea-set, table and chair	Doll bed
Doll	Doll bed	Doll
	Toy animals	
Small animals	Small animals	Small animals
Elephant	Teddy bear; duck	Teddy bear
Teddy bear	.....	Elephant
Sheep	Elephant	Duck on rollers
Cow	Cow	Sheep
Duck on rollers	Sheep	Cow

ing the boys preference with the girls of all ages, the preferences for housekeeping materials by the girls is very much in evidence, while the boys rank these low. There is a decided preference for plastic materials by the girls. Transportation miniature toys are ranked higher by the boys of all ages, than by the girls. Blocks are the least preferred play materials for both sexes and all ages, with one exception.

It may be noted further that the preference for toy animals tends to decrease with advance in age, while the preference for plastic materials increases; interest in housekeeping materials remains about the same for all ages; preference for transportation miniature toys is low for all ages; and blocks are the least preferred by all groups.

Choice of the actual materials. The theoretical preference of the fourteen children for the actual materials was determined in three ways: (1) by the number of times each material was used, (2) by the time each was used, and (3) by the order of use. These various methods correlate with the preferences as determined by the picture test, .43, .59, and .47 respectively. It appears that the time that the material was used correlates better with the picture test than the number of times used or the order of use. However, the number of subjects is so small these correlations are not significant.

In both the picture tests and the actual use of materials the preference for water colors, work table and tools and clay is high, while the preferences for easel and paints, and blackboard and chalk remain low.

those toys which he does not have at home. Blocks which were the least preferred are found in the least number of homes. However, an insignificant correlation of .19 was obtained between the ranking of the materials

TABLE 3

Comparisons of total sex preferences among the groups of play materials and the total group preferences

BOYS	GIRLS	TOTAL GROUP
Plastic materials	Housekeeping materials	Plastic materials
Toy animals	Manipulative materials	Toy animals
Playground apparatus	Playground apparatus	Housekeeping materials
Large toys for active play	Toy animals	Playground apparatus
Transportation miniature toys	Plastic materials	Large toys for active play
Housekeeping materials	Large toys for active play	Manipulative materials
Manipulative materials	Transportation miniature toys	Transportation miniature toys
Blocks	Blocks	Blocks

TABLE 4

Comparisons of age preferences among the groups of play materials

FOUR-YEAR-OLDS	FIVE-YEAR-OLDS	SIX-YEAR-OLDS
Toy animals	Plastic materials	Plastic materials
Housekeeping materials	Toy animals	Playground apparatus
Large toys for active play	Housekeeping materials	Housekeeping materials
Playground apparatus; plastic materials		Large toys for active play; toy animals
.....	Playground apparatus; large, toys for active play	.....
Transportation miniature toys	.....	Manipulative materials
Manipulative materials	Transportation miniature toys	Transportation miniature toys
Blocks	Blocks	Blocks

Relation of preferences to toys in the home. Of the 321 first preferences, 59 per cent were found in the home; of the 417 lowest ranks, 37 per cent were found in the home. These percentages indicate a slight tendency on the part of the child to prefer materials which he has at home; and to prefer the least found in the largest number of homes and the children's preferences as determined by the picture tests. A correlation of .40 was obtained between the mother's rankings and the children's.

Comparison with other studies. It is interesting to note how the results of

the present investigation compare with the results of previous investigations. There is agreement in that:

(1) The interest in clay and housekeeping materials is high for all ages; (Garrison (5) and Bott (1))

(2) Similarity of interest in play materials by all ages is greater than the differences, however, there is a gradual change of interest with advance of years; (Bott (1), Farwell (4), and Van Alstyne (10)).

(3) The kiddy car is ranked low by the older children; (Hulson (6) and Bott (1)).

(4) Boys show a higher preference for woodwork, larger blocks, and materials which require larger muscle activity, while girls show a higher preference for housekeeping materials and materials for more passive play; (Bridges (2) (3), Van Alstyne (10), and Garrison (5)).

(5) Preference for clay is high for both sexes. (Garrison (5)).

There is a difference in that:

(1) Blocks are ranked as the least preferred by the age groups, sexes and total group in the present study, whereas, in previous investigations conducted by Garrison (5), Hulson (6), Bridges (3) and Van Alstyne (10) they were ranked as high preference;

(2) A higher preference for locomotor toys, or large toys for active play, playground apparatus, and toy animals tends to be more evident in the present study.

(3) The high preference for the train which was manifested in Bott's (1) investigation is not evident in the present study.

In conclusion, the paired comparisons of pictures has some value as a method in determining the preferences of children for certain types of materials. The technique has value as a laboratory exercise for students in child psychology. It appears concrete and definite and affords opportunity for direct contact with the individual child.

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Undesirable Behavior Traits in Junior High School Students

E. B. Hurlock and L. C. McDonald[1]

STUDIES of adolescent behavior problems have been many, but, for the most part, have been limited to generalized observations. What studies have been made from a scientific point of view have indicated that there is a relationship between undesirable behavior and chronological age; that specific forms of undesirable behavior are accompanied by certain characteristic forms of behavior, and that there are sex differences to be found in these. It was with the hope of throwing further light on these conclusions that the present study was undertaken.

HISTORICAL BACKGROUND

Monroe (7) who was interested in the social element of school life, made, in 1899, a statistical study of the qualities children desire in their companions. Following this came a number of questionnaire studies of children's behavior, ideals and ambitions, but most of these lacked a systematic point of view.

In 1916, when the College of Education of the University of Minnesota, in coöperation with the Medical School, opened a clinic for the mental and educational examination of children, Wickman et al. (10) carried out a series of studies of early behavior disorders. Teachers were asked to list all kinds of behavior problems prevalent in the children in their classes. Four hundred and twenty-eight different items were mentioned which, when classified, numbered about fifty. The teachers were then asked to rate their pupils on behavior records made up of their problem cases, and also on a behavior and personality chart devised by Wickman. The total incidence of behavior problems of the 874 children studied was then computed in terms of percent, the highest of which were whispering (74.7 per cent); inattention (59.0 per cent); carelessness (44.0 per cent) and tattling (42.0 per cent); the lowest were suspicion (2.1 per cent); cruel bullying (1.7 per cent); truancy (1.6 per cent) and temper outbursts (1.5 per cent). Sex differences in troublesome behavior showed it to be much less frequent in girls than in boys. The peak of troublesome behavior for boys was 11 years and for girls, 13 years.

Blatz and Bott (2) carried out a study modelled along the lines of Wickman's study, but which carried the observation of the children studied over a number of years. Some of the

[1] The senior author supervised the study and prepared the manuscript for publication; the junior author collected the data and presented them as a Master's Essay in Columbia University.

outstanding results of their study indicated that the peak of misdemeanors came from 13–14 years, indicating a pre-adolescent trend; that the number of misdemeanors falls off markedly with age, and that the frequency is not clearly related to chronological age, but varies inversely with the intelligence quotient for boys, but not for girls.

McClure (6) studied the characteristics of the problem children in grades 4 to 6 of the Toledo schools. He found that the largest number of problem cases occurred in the sixth grade, which corresponds approximately to 11 and 12 years, chronological age. The problem child was found usually to be retarded in school, with mean I.Q. of 90, and an average of 7.7 undesirable traits. These were found to be; constantly annoying children nearby, not knowing how to study, excessive whispering, carelessness, general disobedience and disrespect of teacher, disorder during intermissions, and unreliability.

Leal (4) studied, by a means of questionnaires given to teachers, the relationship between physiological maturity and certain characteristic behavior traits of boys and girls. The behavior traits most frequently reported were impatience with restrictions, self-assertion, interest in the opposite sex, avoidance of the opposite sex, coöperation and gregariousness. She found all the traits she had listed occurring to a greater or lesser extent in all stages of development except in the case of gregariousness, which occurred in girls only in the matured age.

Wilson (11) had two psychology students visit classrooms between 9 and 10 o'clock for ten consecutive observations to determine how much whispering occurs. From these observations, he concluded that "the gross amount of whispering in a particular grade was a function of the situation rather than the reflection of any fundamental developmental continuum."

Ackerson (1) studied the behavior problems in the home and neighborhood by obtaining data concerning these from parents. He used 139 traits which he grouped into "personality" and "conduct" categories. The two outstanding conclusions are that behavior problems increase with age up to about the years 9 to 13, when there is a decrease; and that each form of behavior, when studied individually, manifested its own type of relation with chronological age and I.Q.

From the studies summarized briefly above, and chosen from the many dealing with the general problem of behavior studies because of their specific relationship to the problem to be reported herewith, it is apparent that there is a relationship between chronological age and behavior, and also, that there is a sex difference in many behavior traits.

PRESENT STUDY

The purpose of the study to be reported below was to find if there is a relationship between chronological age and specific behavior traits, if any sex differences exist in these, and to find the relationship between a specific trait and other traits.

In order to obtain facts for this study, the opinions of teachers concerning the prevalance of undesirable

behavior traits among their pupils had to be relied upon. No doubt, prejudice to a certain degree influenced their opinions but, as the interest of the writers was in representative groups of boys and girls of specific ages, rather than in individual students, these distorted opinions may, to a certain extent, be counteracted by opinions of a too favorable sort.

The school in which the present study was made is a Junior High School in the Upper Bronx, New York City. It is located in a fairly well-to-do neighborhood and the students are predominately Jewish. From this school, 790 children, of whom 438 were boys and 352 girls of the ages eleven to fourteen inclusive, were selected to be studied. Because the numbers of students older than fourteen and younger than eleven were too small to justify drawing conclusions from a study of their behavior, they were not included in the present study. The distribution of subjects is presented in table 1.

TABLE 1

Distribution of subjects

AGE	BOYS	GIRLS	TOTAL
11	94	84	178
12	152	132	284
13	96	76	172
14	96	60	156
Total...	438	352	790

At the beginning of the fall term each classroom teacher was given a list of the thirty-seven behavior traits which she was to look for in her pupils during the term. Classroom teachers were chosen because they meet their groups under more similar circumstances than substitute teachers do, and they are in a position to become better acquainted with their pupils. All the traits listed are found in Wickman's (10) behavior scale; some of his have been excluded however, for his research concerned itself with an entire school population and contained many traits "outgrown" and not found in older children. At the end of the term the teacher was asked to check for each pupil in the class the list of traits given on the Behavior Inventory, as shown on page 281.

Results. Table 2 shows the incidence of the behavior traits studied. The data were obtained by counting the number of children having each specific trait and then by finding what per cent that number is of the total number of children. The results for boys and girls were kept separate. As traits 11, 12, 13, 14 and 36 were not reported for any of the children studied, they are, therefore, not included in the tables.

In this table, it may be observed that the traits occurring most often in boys are whispering, inattentiveness, carelessness, failure to prepare and interrupting; those which occurred least often are destruction or abuse of school property, cruelty, truancy, easily-frightened and insubordination. In girls, whispering, inattentiveness, carelessness, lack of interest and day-dreaming head the list of undesirable behavior traits; those occurring least frequently are cruelty, destruction of school property, bullying other children and insubordination to the authority of the teacher.

Table 3 shows the relationship, in

BEHAVIOR INVENTORY

Name.....

Age.....

TRAITS	HAS OCCURRED ONCE OR TWICE	OCCURS WITH OCCASIONAL FREQUENCY	HAS BECOME ALMOST HABITUAL
1. Suspiciousness			
2. Resentfulness			
3. Fearfulness			
4. Cruelty			
5. Tendency to depression			
6. Tardiness			
7. Truancy			
8. Destruction or abuse of school property			
9. Lying			
10. Cheating in school work			
11. Stealing			
12. Swearing			
13. Smoking			
14. Talking—writing obscene notes—pictures			
15. Whispering			
16. Interrupting by impromptu recitations, etc.			
17. Inability to work calmly			
18. Inattentiveness			
19. Lack of interest			
20. Careless or inaccuracy			
21. Failure to prepare			
22. Laziness			
23. Disobedience (willful)			
24. Insubordination to teachers authority			
25. Bullying other children			
26. Tattling			
27. Stubbornness			
28. Temper-tantrums			
29. Rudeness to others			
30. Shy, withdrawing type			
31. Over-sensitive			
32. Showing off			
33. Day-dreaming			
34. Nervousness			
35. Easily frightened			
36. Tomboy girl—sissy boy			
37. Easily led, suggestibility			

per cent, of the frequency of undesirable behavior to chronological age. The figures in this table were obtained by weighting the frequency of occurrence of each trait. For example, rudeness was a trait noticeable in 44 out of 438 boys, thus giving an incidence percentage of 9.8. Some of the boys were rude once or twice; others showed rudeness with "occasional frequency," while in others, the trait "had become almost habitual." The

writers therefore weighted each degree of frequency 1, 2, and 3 respectively, the three, the frequency score for that trait was obtained. To illustrate: in

TABLE 2

Incidence chart; showing the relationship (in per cent) of the incidence of undesirable behavior to chronological age

NUMBER	NAME OF TRAIT	BOYS					GIRLS				
		Age 11	Age 12	Age 13	Age 14	Total per cent	Age 11	Age 12	Age 13	Age 14	Total per cent
		Number in each group					Number in each group				
		94	152	96	96	438	84	132	76	60	352
1	Suspiciousness	8.5	10.5	14.6	17.7	12.6	4.8	6.1	6.6	20.0	8.2
2	Resentfulness	22.3	13.8	16.6	33.3	20.5	6.0	18.2	11.8	27.0	15.3
3	Fearfulness	6.4	13.1	4.2	12.5	9.5	2.4	9.8	7.9	8.3	7.4
4	Cruelty	0	0.7	4.2	3.1	1.8	0	0	0	0	0
5	Tendency to depression	4.2	8.5	14.6	18.8	11.2	4.8	6.1	6.6	6.9	6.0
6	Tardiness	26.5	30.3	29.1	30.2	29.2	9.5	14.4	23.8	6.9	13.9
7	Truancy	1.1	2.0	4.2	10.4	4.3	2.8	2.3	2.6	5.0	2.8
8	Destruction or abuse of school property	0	0	0	2.1	0.5	0	0	0	0	0
9	Lying	12.7	5.3	8.3	8.3	8.2	4.8	3.0	4.2	0	3.1
10	Cheating	10.6	27.6	31.2	26.1	24.4	17.9	25.0	18.4	16.7	17.3
15	Whispering	75.2	84.2	70.7	62.5	74.7	66.6	86.4	60.5	65.0	72.4
16	Interrupting	11.7	19.7	45.7	45.9	29.4	9.7	15.2	18.4	0	9.7
17	Inability to work calmly	11.7	16.5	29.1	20.8	19.2	7.1	18.2	10.5	10.0	12.5
18	Inattentiveness	27.0	48.7	45.7	51.1	44.1	14.3	46.2	44.0	36.7	36.6
19	Lack of interest	14.9	28.9	16.6	37.5	27.4	14.3	40.9	23.8	21.7	27.6
20	Carelessness	25.5	46.1	43.7	39.6	39.7	15.5	51.5	40.8	23.3	35.8
21	Failure to prepare	28.1	38.9	41.6	42.1	37.4	2.4	24.2	15.8	13.3	15.3
22	Laziness	6.4	25.0	29.2	29.2	22.8	2.4	10.6	13.2	15.0	12.2
23	Disobedience	8.5	11.9	16.6	14.6	12.8	2.4	4.5	7.9	8.3	5.4
24	Insubordination	3.2	2.6	7.3	10.4	5.5	0	.8	2.6	6.7	2.0
25	Bullying others	4.3	3.9	13.5	6.3	6.6	1.2	1.5	0	3.3	1.4
26	Tattling	6.4	13.8	6.2	8.3	9.4	3.6	16.0	17.1	15.0	12.8
27	Stubbornness	9.5	19.7	14.6	27.1	18.0	0	10.6	13.2	20.0	10.2
28	Temper-tantrums	6.4	14.5	4.2	11.4	9.8	0	9.1	4.2	1.7	4.5
29	Rudeness to others	6.4	7.3	15.6	18.8	10.0	0	4.6	2.6	3.3	2.8
30	Shy, withdrawing	19.1	30.3	16.8	12.5	21.0	21.4	30.3	34.2	25.0	28.1
31	Over-sensitive	6.4	22.4	6.2	12.5	13.2	2.4	9.8	15.8	20.0	11.1
32	Showing-off	9.5	11.9	34.4	29.2	20.1	1.2	4.5	5.3	16.7	6.0
33	Day-dreaming	4.3	26.3	22.9	21.8	19.9	8.3	22.7	27.6	23.3	23.5
34	Nervousness	10.6	11.9	18.7	16.7	14.2	0	6.1	10.5	6.7	5.7
35	Easily frightened	6.4	7.4	4.2	3.2	5.5	0	5.3	10.5	16.7	7.1
37	Suggestibility	6.4	6.6	5.2	12.5	7.6	2.4	6.1	4.0	13.3	6.0

and, by multiplying the number of cases under each heading by its respective frequency number and adding

rudeness, 32 of the cases occurred once or twice; 11 with occasional frequency and only one had become almost ha-

bitual. Therefore (32 × 1) plus (11 × 2) plus (1 × 3) = 57, the old boys than in any of the older boys. Fourteen seems to be the most

TABLE 3

The relationship (in per cent) of the frequency of undesirable behavior to chronological age

NUMBER	NAME OF TRAIT	BOYS					GIRLS				
		Age 11	Age 12	Age 13	Age 14	Total per cent	Age 11	Age 12	Age 13	Age 14	Total per cent
		Number in each group					Number in each group				
		94	152	96	96	438	84	132	76	60	352
1	Suspiciousness	10.6	11	0.5	18	13.0	4.8	6.1	6.6	20.0	8.2
2	Resentfulness	26.6	18	19	40	24.7	7.1	18.2	11.8	30.0	16.2
3	Fearfulness	6.4	16	4	17	11.4	2.4	9.9	7.9	11.7	8.0
4	Cruelty	0.0	1	6	3	2.3	0.0	0.0	0.0	0.0	0.0
5	Tendency to depression	4.3	9	15	22	11.9	4.8	3.8	6.6	6.7	6.0
6	Tardiness	45.7	43.5	33	40	40.9	9.6	16.7	28.9	10.0	16.4
7	Truancy	1.0	1	6	17	5.9	3.6	4.6	5.3	8.3	5.2
8	Destruction or abuse of school property	0.0	0	0	2	0.5	0.0	0.0	0.0	0.0	0.0
9	Lying	15.0	5	3	8	8.9	4.8	3.0	3.9	0.0	3.1
10	Cheating	17.0	33	35	26	28.5	17.8	28.0	21.0	16.7	22.1
15	Whispering	12.4	13.6	11.0	89	118.0	83.3	132.0	108.0	93.3	108.0
16	Interrupting	16	28	59	56	38.3	0.0	15.9	21.1	0.0	10.5
17	Inability to work calmly	17	26	40	24	37.9	7.1	19.7	15.8	10.0	14.2
18	Inattentiveness	33	62	57	57	53.8	14.2	56.0	61.8	46.7	45.8
19	Lack of interest	19	39	21	46	32.2	17.8	52.3	31.6	33.3	36.4
20	Carelessness	33	65	72	55	57.3	17.8	60.6	59.2	33.3	45.5
21	Failure to prepare	33	41	48	47	42.0	4.8	31.1	21.0	16.7	20.1
22	Laziness	8.5	34	39	40	30.9	4.8	28.1	18.4	20.0	19.0
23	Disobedience	11	13	23	21	16.4	2.4	4.5	7.9	8.3	5.4
24	Insubordination	5	3	11	13	7.3	0.0	0.8	2.6	6.7	2.0
25	Bullying	6	4	16	6	7.5	1.2	1.5	0.0	3.3	1.4
26	Tattling	6	15	6	8	9.8	3.6	17.4	19.7	15.0	14.2
27	Stubbornness	14	26	23	37	22.9	0.0	10.6	13.2	30.0	11.9
28	Temper-tantrums	85	16	4	14	11.2	0.0	9.1	4.0	1.7	4.5
29	Rudeness to others	6	7	22	20	13.0	0.0	4.6	2.6	3.3	2.8
30	Shy, withdrawing	22	36	19	12	24.2	30.8	36.4	38.2	30.0	34.5
31	Over-sensitive	6	30	6	12	16.0	4.8	11.4	15.8	23.3	12.8
32	Showing-off	20	14	55	37	29.5	1.2	4.6	5.3	16.7	6.0
33	Day-dreaming	11	32	31	24	25.5	10.7	28.1	39.5	36.7	27.8
34	Nervousness	17	16	21	19	17.8	0.0	7.6	15.8	6.7	7.4
35	Easily frightened	8.5	9	4	5	6.9	0.0	5.3	10.5	23.3	8.2
37	Suggestibility	8.5	8	5	14	8.7	2.4	6.1	4.0	15.0	6.3

frequency of rudeness, which is 13 per cent of the total boys.

It is apparent that the behavior traits are less evident in eleven-year-old boys than in any of the older boys. Fourteen seems to be the most troublesome age. Those traits that show an increase with age are suspiciousness, tendency to depression, truancy, interrupting, failing to pre-

pare, laziness, rudeness, and suggestibility. These traits reach their peaks at fourteen for this age group. However, 14-year-old boys are much less sensitive, shy, fearful, talkative and tattling than are twelve-year-old boys. Those traits that reach their peak at thirteen are cheating, inability to work calmly, disobedience, bullying, showing off and nervousness. Fearfulness, whispering, carelessness, tattling, temper-tantrums, shyness, over-sensitiveness, day-dreaming and easily frightened occur in greater percentages in twelve-year-old boys. Only one trait, lying, is more evident in the 11-year-old group.

The 11-year group again evidences fewer of the undesirable behavior traits studied when comparing the age differences in girls. The traits showing increasing percentages with increasing age are suspiciousness, tendency to depression, truancy, laziness, disobedience, insubordination, stubbornness, over-sensitiveness and showing off. Here again there are no traits which show a decided falling off, but the fourteen year group is less tardy, whispers less, shows less inability to work calmly, lack of interest, carelessness and temper-tantrums than do their 12-year-old colleagues.

Highest percentages are reached in the 14-year-old group in suspiciousness, resentfulness, laziness, stubbornness, over-sensitiveness, showing off and suggestibility. In the thirteen year group, high percentage for the trait is found in interrupting, tattling, shyness, day-dreaming and nervousness. The 12-year-olds show the highest for fearfulness, tardiness, cheating, whispering, inability to work calmly, inattentiveness, lack of interest, carelessness, failure to prepare, temper-tantrums and rudeness. Though the per cent itself is very small, lying again seems to be the only trait in which the 11-year-olds surpass the others.

In comparing the results for the two sexes, it is apparent that 11-year-old girls show more cheating, shyness, and day-dreaming than boys. However the boys surpass them for nearly every other trait except lack of interest, which they both reveal to the same degree. Resentfulness, lack of interest, carelessness and tattling are more prevalent in 12-year-old girls than in boys of the same age, who show stubbornness, over-sensitiveness and showing-off. They are most alike in the following traits; truancy, cheating, whispering, inability to work calmly, inattentiveness, shyness, day-dreaming and suggestibility.

Thirteen-year-old boys and girls reveal about the same degree of tardiness, inattentiveness, carelessness, and stubbornness. They are not alike in fearfulness, lack of interest, tattling, shyness, over-sensitiveness, day-dreaming and suggestibility, in which traits the girls surpass the boys. In cheating, tendency to depression, lying, whispering, interrupting, failure to prepare, laziness, disobedience, bullying, rudeness and showing off the boys surpass the girls.

By comparing the two 14-year-old groups, it becomes evident that they are quite alike in the amount of whispering and day-dreaming they do. So is one about as easily led as the other. The girls are more suspicious, tattling, shy, and sensitive.

The boys show more of all the other undesirable traits, especially tardiness, interrupting, inability to work calmly, inattentiveness, lack of interest, and showing off. This is not as surprising as it might seem if it were not known that the 14-year-old boys present the greatest amount of undesirable behavior traits for the age group.

The writers also considered some of the traits separately in an effort to show what traits appear coincidently with a specific trait. Interest prompted the selection from those traits that occur in about 20 per cent or more of the children. The frequency of occurrence was used in scoring for each trait. The scoring was accomplished in the following manner. Every time resentfulness, for example, was checked by the official teacher, it was recorded in the proper frequency column and all other traits accompanying it were scored also in proper columns. The following are the specific traits chosen for study and will be taken in the order named:

1. Resentfulness
2. Cheating
3. Whispering
4. Day-dreaming

The frequency of the specific trait is taken as 100 per cent for all purposes of comparison with other traits. If another trait appears with the same frequency as the specific one, it will show 100 percent, too. It happens occasionally that the percentage is more than 100. This shows in resentfulness, for instance; it indicates that resentful children are even greater whisperers than they are resentful.

Table 4 shows the results of the scoring for resentfulness. The coincident traits in the order of their frequency are:

TABLE 4

Resentfulness: the ratio (in per cent) of the frequency of the coincident traits to the frequency of resentfulness

NUMBER	NAME OF TRAIT	BOYS	GIRLS
1	Suspiciousness	31.9	31.6
3	Fearfulness	31.9	21.1
4	Cruelty	5.6	0.0
5	Tendency to depression	16.8	17.6
6	Tardiness	65.5	35.2
7	Truancy	7.5	14.0
8	Destruction or abuse of school property	1.9	0.0
9	Lying	26.2	14.0
10	Cheating	39.3	38.6
15	Whispering	142.0	184.0
16	Interrupting	46.9	21.1
17	Inability to work calmly	37.4	31.6
18	Inattentiveness	66.2	98.2
19	Lack of interest	56.1	8.7
20	Carelessness	67.2	66.6
21	Failure to prepare	57.1	45.6
22	Laziness	52.3	31.6
23	Disobedience	33.6	17.6
24	Insubordination	20.6	7.0
25	Bullying others	18.8	3.5
26	Tattling	15.0	42.1
27	Stubbornness	59.0	59.7
28	Temper-tantrums	31.9	21.1
29	Rudeness to others	20.6	14.6
30	Shy, withdrawing	13.1	14.0
31	Over-sensitive	16.8	17.6
32	Showing-off	40.2	28.1
33	Day-dreaming	26.2	52.5
34	Nervousness	29.9	21.1
35	Easily frightened	11.2	14.0
37	Suggestibility	20.6	24.5

Boys

	per cent
Whispering	142
Carelessness	67.2
Inattentiveness	66.2
Tardiness	65.5
Stubbornness	59
Failure to prepare	57.1

Lack of interest	56.1
Laziness	52.3

Girls

Whispering	184
Inattentiveness	98.2
Lack of interest	80.7
Carelessness	66.6
Subbornness	59.7
Day-dreaming	52.5
Failure to prepare	45 6
Tattling	42.1

TABLE 5

Cheating: the ratio (in per cent) of the frequency of the coincident traits to the frequency of cheating

NUMBER	NAME OF TRAIT	BOYS	GIRLS
1	Suspiciousness	28.9	25.6
2	Resentfulness	33.6	23.0
3	Fearfulness	14.4	18.0
4	Cruelty	4.8	0
5	Tendency to depression	22.5	10.2
6	Tardiness	57.8	20.5
7	Truancy	8.1	0
8	Destruction or abuse of school property	1.6	0
9	Lying	19.2	12.8
15	Whispering	126.0	154.0
16	Interrupting	72.9	23.0
17	Inability to work calmly	60.9	28.2
18	Inattentiveness	99.5	101.0
19	Lack of interest	62.6	92.2
20	Carelessness	102.5	108.8
21	Failure to prepare	70.4	46.2
22	Laziness	51.2	53.9
23	Disobedience	33.6	15.4
24	Insubordination	16.0	0
25	Bullying others	12.8	0
26	Tattling	14.4	25.6
27	Stubbornness	22.5	12.8
28	Temper-tantrums	9.6	2.6
29	Rudeness to others	24.1	2.6
30	Shy, withdrawing	24.1	38.5
31	Over-sensitive	23.2	20.5
32	Showing-off	50.4	5.1
33	Day-dreaming	40.0	66.7
34	Nervousness	32.0	7.7
35	Easily frightened	12.8	10.2
37	Suggestibility	24.1	20.5

What picture is obtained of the resentful child? It might be said that the resentful child is a great whisperer. He is apt to be careless, inattentive and stubborn. He lacks interest in school work and therefore fails to prepare for it or vice versa. Both the girl and boy present somewhat the same picture. The girl is a greater whisperer; she is more inattentive and more disinterested. She is just as careless and stubborn, but besides she tattles and day-dreams. The resentful boy is probably lazier than the girl.

What about the child who cheats? What other characteristics does he seem to display? By studying table 5 the following traits are found characteristic of them.

Boys

	per cent
Whispering	126
Carelessness	102.5
Inattentiveness	99.5
Interrupting	72.9
Failure to prepare	70.4
Lack of interest	62.6
Inability to work calmly	60.9
Tardiness	57.8
Laziness	51.2
Showing-off	50.4

Girls

Whispering	154
Carelessness	108.8
Inattentiveness	101
Lack of interest	92.2
Day-dreaming	66.7
Laziness	53.9
Failure to prepare	46.2

The boy who cheats whispers less than the resentful boy, but he is much more careless and inattentive. He is also lazy and tardy quite regularly. He fails to prepare more often than

the resentful boy and is quite unable to work calmly. He interrupts and shows off. The girl who cheats is a chronic whisperer though not as great a one as the resentful girl. She is very careless and inattentive. She shows no interest in her work, fails to prepare for it, in fact is too lazy to do so. Cheating to obtain grades seems to be the line of least effort. She would rather spend her time day-dreaming.

TABLE 6

Whispering: the ratio (in per cent) of the frequency of the coincident traits to the frequency of whispering

NUMBER	NAME OF TRAIT	BOYS	GIRLS
1	Suspiciousness	10.7	7.3
2	Resentfulness	18.5	14.4
3	Fearfulness	11.3	7.3
4	Cruelty	2.0	0.0
5	Tendency to depression	6.0	5.0
6	Tardiness	28.7	12.0
7	Truancy	3.3	4.4
8	Destruction or abuse of school property	0.4	0.0
9	Lying	6.6	3.1
10	Cheating	22.4	19.4
16	Interrupting	32.1	9.4
17	Inability to work calmly	19.5	9.4
18	Inattentiveness	43.9	41.4
19	Lack of interest	25.5	30.6
20	Carelessness	48.5	39.8
21	Failure to prepare	35.7	18.3
22	Laziness	26.3	17.6
23	Disobedience	13.1	5.0
24	Insubordination	6.6	1.6
25	Bullying others	6.4	1.3
26	Tattling	8.0	13.1
27	Stubbornness	17.0	11.0
28	Temper-tantrums	9.6	3.4
29	Rudeness to others	10.2	2.6
30	Shy, withdrawing	17.6	23.5
31	Over-sensitive	11.3	8.9
32	Showing-off	22.0	5.5
33	Day-dreaming	21.5	26.7
34	Nervousness	14.0	6.8
35	Easily frightened	5.5	5.2
37	Suggestibility	7.0	5.8

Table 6 reveals the accompanying undesirable behavior traits of some whisperers.

Boys

	per cent
Carelessness	48.5
Inattentiveness	43.9
Failure to prepare	35.7
Interrupting	32.1
Tardiness	28.7
Laziness	26.3
Lack of interest	25.5

Girls

Inattentiveness	41.4
Carelessness	39.8
Lack of interest	30.6
Day-dreaming	26.7
Shy—withdrawing	23.5

As the writers scored the many papers, they noted that there were many cases in which whispering was the only undesirable trait evident. Therefore it is difficult to say that certain traits are prevalent in most whisperers. However it can be said that if the whisperer has other accompanying undesirable traits, they are most likely to be carelessness, inattentiveness, and lack of interest. The boy whisperer might evidence some laziness, tardiness and failure to prepare; the girl, day-dreaming.

The last trait studied is day-dreaming. The results are presented in table 7. What are the accompanying traits?

Boys

	per cent
Whispering	119.7
Carelessness	117.8
Inattentiveness	92.8
Laziness	58
Lack of interest	50
Interrupting	57

Showing off	49
Failure to prepare	47.4
Inability to work calmly	47.4

Girls

Whispering	134.6
Inattentiveness	91.8
Carelessness	87.7
Lack of interest	65.3
Laziness	57.1
Failure to prepare	51

TABLE 7

Day-dreaming: the ratio (in per cent) of the frequency of the coincident traits to the frequency of day-dreaming

NUMBER	NAME OF TRAIT	BOYS	GIRLS
1	Suspiciousness	19.7	16.3
2	Resentfulness	21.4	24.5
3	Fearfulness	10.7	8.2
4	Cruelty	0.0	0.0
5	Tendency to depression	21.4	10.2
6	Tardiness	44.6	18.4
7	Truancy	9.8	13.3
8	Destruction or abuse of school property	0.0	0.0
9	Lying	12.5	2.0
10	Cheating	43.7	33.7
15	Whispering	119.7	134.6
16	Interrupting	57.1	24.5
17	Inability to work calmly	47.4	28.6
18	Inattentiveness	92.8	91.8
19	Lack of interest	50.0	65.3
20	Carelessness	117.8	87.7
21	Failure to prepare	47.4	51.0
22	Laziness	58.0	57.1
23	Disobedience	19.6	8.2
24	Insubordination	12.5	4.1
25	Bullying others	5.4	2.0
26	Tattling	12.5	16.3
27	Stubbornness	25.0	16.3
28	Temper-tantrums	14.3	0.0
29	Rudeness to others	17.0	4.1
30	Shy, withdrawing	29.5	35.7
31	Over-sensitive	31.4	24.5
32	Showing-off	49.1	12.2
34	Nervousness	36.6	12.2
35	Easily frightened	10.7	6.1
37	Suggestibility	16.1	18.4

Boys who are day-dreamers reveal almost the same degree of whispering and carelessness. They are just about as inattentive as girls who are day-dreamers; the girls being the greater whisperers, and lackers of interest. Both are unprepared, the chances are, for both are lazy. The girls tend more to shyness than to showing-off as the boys do.

SUMMARY AND CONCLUSION

Is there any relationship between chronological age and undesirable behavior traits? The evidence presented above indicates that there is, although the peaks for the ages showing the greatest number of undesirable traits do not agree with the studies by Wickman (10) or McClure (6). The peaks obtained in this study are 14 years for boys and 12 years for girls. In the case of Wickman's study, the peaks are 11 and 13 respectively, and in McClure's study, the age peak is at about 12 years. This difference may be explained partly by the fact that the children used as subjects for this study are predominately Jewish and that early maturing among the girls appears to be a characteristic trait, while among the boys, maturing is delayed. This may, to a certain extent, account for the fact that the 13 and 14-year-old girls are less troublesome than the 12-year-old group, while the boys continue to be troublesome to the age of 14 years at least.

In the Junior High School studied, the children are allowed more freedom than in the grammar grades; the 11-year-olds were for the most part in the first and second term of Junior High School and had not become accus-

tomed to the new régime, and, therefore, seemed "very good" in comparison to the others who had been in the school for a longer time. Besides, the 11-year-old group was advanced in school for its age and contained, no doubt, the more serious, less troublesome child.

However the relationship the writers had in mind was not so much that between the amount of undesirable behavior and chronological age, as between specific traits and chronological age. The only traits they found in boys that seemed to bear no relation to age were fearfulness, temper-tantrums, and lack of interest. In girls, they were lack of interest, laziness, bullying other children and rudeness.

Most of the traits were present to some extent in every specific trait chosen for study. The relationship between them is primarily one of degree, therefore. The writers feel that some traits are 'universal' in that they seem to accompany all types of behavior, adult's as well as children's. Primary among these is whispering, about which they agree with Wilson (11) who concluded after studying whispering "that the gross amount of whispering . . . . was a function of the particular situation rather than the reflection of any fundamental continuum."

All traits evidenced whispering as an accompanying trait. The resentful child whispers most, probably an expression of his resentfulness. The child who fails to prepare is next, trying to get his lessons in school, perhaps. The cheater and inattentive child are next; the one whispering while cheating, the other merely not paying attention. Is it surprising to find the shy, with-drawing type evidencing the least amount of whispering?

The method of finding this relationship seems to be a reliable one, for it has borne out many accepted facts. For instance, the outstanding characteristics, i.e. the characteristics that belong more to one specific trait than others, of resentfulness are stubbornness and tardiness; cheaters show lack of interest and inattentiveness, and fail to prepare. As would be expected, inattentive children were found to be careless; and the careless, inattentive. Children who fail to prepare are lazy. The shy, with-drawing child is oversensitive, and day-dreamers are careless, lazy and inattentive.

This study has convinced the writers that there is a definite relationship between undesirable behavior traits and chronological age, depending in a measure upon sex difference. A majority of the traits bear a relationship to other specific traits such as would commonly be induced from casual observation and pure reasoning. The remainder bear a relationship which, while not so apparent, is none the less definite and dependent to some extent upon mental age, racial characteristics, environment and other commonly accepted factors.

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Brief Report

A Note on Reaction Times in Infants

THE following note based on data incidental to another research (2) is a comparison of the reaction time of respiration with the reaction time of the body startle in 6 infants. The stimulus was a tone of 580 cycles, with a duration of .07 second and an intensity of 85 sensation units. The reaction time of the body startle was measured by the stabilimeter, and of respiration by a pneumograph attached to the abdomen of the infant. Both records were made on a polygraph tape. Fifty stimulations were given the 6 infants. With every stimulation a respiratory response was evoked, but 15 stimulations failed to produce a body startle although an 85 decibel tone is a fairly loud sound.

The average reaction time for respiration was .09 second, the standard deviation .029, and the standard error of the mean .004. The mean respiratory time for only those stimulations which gave startles was .09 second, the standard deviation .027, and the standard error of the mean .005. In each of these cases the respiratory reaction time was less than the corresponding time for the startle. The average reaction time of the body startle was .19 second, standard deviation .14, and standard error of the mean .025. The value of .19 second compares well with the value of .18 second reported in a previous study (1). The mean reaction time of the body startle, therefore, is about twice that for respiration.

A glance at the standard deviations of the two values suggests that the reaction time of respiration is the less variable measure. In order to compare the variability of these measures Pearson's coefficient of variability was used. The reaction time of respiration was found to be 44 per cent as variable as that of the startle response.

These data do not represent large samplings but the fact that the value for the startle reaction is practically the same as previously reported indicates that the sampling probably is adequate. The value for respiration needs to be checked before a similar statement can be made. However, the fact that the average value for only those cases giving a startle is the same as average of the total number of respirations suggests its reliability.

Perhaps the most interesting finding is the fact that with a loud tone the startle response occurs in only 70 per cent of the stimulations, whereas the respiratory response occurred 100 per cent of the time.

ESTHER STUBBS
ORVIS C. IRWIN.

REFERENCES

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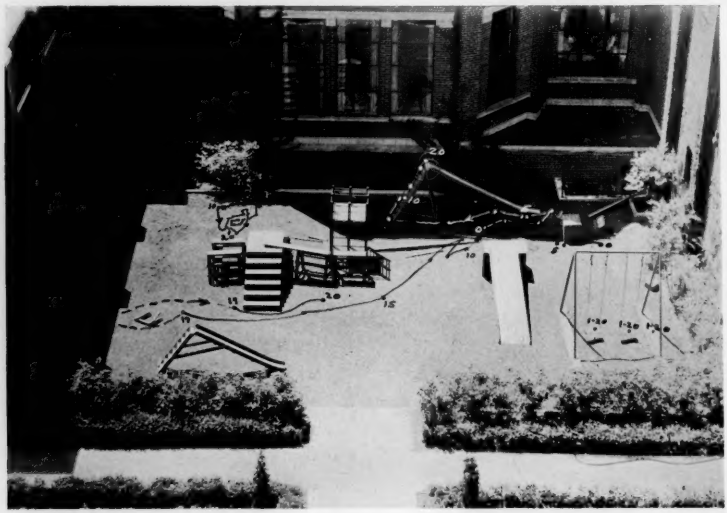
(2) Irwin, Orvis C., Stubbs, Esther M., and Weiss, LaBerta A.: Studies in infant behavior I. Univ. Iowa Stud., Stud. in Child Welfare, 1934, **9**, No. 4, [In press].

Analysis of Child Behavior by Intermittent Photography

CONTINUOUS recording with motion pictures is not only expensive but also frequently results in a larger quantity of material than is desirable or necessary for analytic purposes. Dr. Bruce Greenshields of Denison University, in researches at the University of Michigan, has evolved equipment in connection with a study of traffic, which permits the taking of pictures on sixteen-millimeter film at predetermined intervals. A Simplex motion picture camera capable of taking single frames is operated by a motor driven by an automobile storage battery. The time interval between exposures can be varied from one-half a second to two seconds by changing the voltage.



The applicability of the equipment to the investigation of the activities of children is being studied at the present time in connection with the child development research program of the University Elementary School of the University of Michigan. The camera was set up on the roof of the building and pointed downward at the

playground area. A record has been made for one hour at the rate of one picture every two seconds for the activities of the five-year-old group on a court playground. Some preliminary analysis of the material has been made with the assistance of student help under the Federal Emergency Relief Act. The general procedure consists in projecting a picture of the playground site and tracing it upon a sheet of white paper. The outline picture is redrawn with duplicator ink and a supply of copies obtained. Successive pictures are then projected and a trace of the path of each child is made with a colored pencil. One minute of film record suffices to cover a sheet to the point of confusion with the orbits of half a dozen active youngsters. The illustration gives the activity of six children in each of 20 two-second intervals. Three paths are shown with dots at the intervals. Three children remained in their general location at the swing. Since the pictures were taken at some distance, positive identification of the children was facilitated by the use of telephoto pictures as a supplement.

The type of record keeping described should be an aid in the study of the interest value of materials and equipment, the amount and character of physical activity of children, analysis of social behavior, and the significance of the several types of data in terms of other determinable characteristics for the children involved.

Roy S. Swinton.